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LEGISLATIVE HEARING ON S. 1733, CLEAN ENERGY JOBS AND AMERICAN POWER ACT

HEARING

BEFORE THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE

ONE HUNDRED ELEVENTH CONGRESS

FIRST SESSION

OCTOBER 29, 2009

Printed for the use of the Committee on Environment and Public Works

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COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

ONE HUNDRED ELEVENTH CONGRESS
FIRST SESSION

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LEGISLATIVE HEARING ON S. 1733, CLEAN ENERGY JOBS AND AMERICAN POWER ACT

THURSDAY, OCTOBER 29, 2009

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
Washington, DC.

The full committee met, pursuant to notice, at 9:30 a.m. in room 406, Dirksen Senate Office Building, Hon. Barbara Boxer (chairman of the full committee) presiding.

Present: Senators Boxer, Inhofe, Alexander, Barrasso, Baucus, Bond, Cardin, Carper, Crapo, Gillibrand, Klobuchar, Lautenberg, Merkley, Sanders, Specter, Udall, Vitter, Voinovich, and Whitehouse.

Senator BOXER. The committee will come to order.

We are very pleased to have these distinguished panels. We actually have four distinguished panels, and so we are going to get right to it. I am going to waive my opening statement, and if I have to, make one at the end, and call on, therefore, Senator Specter for his 2-minute opening statement.

OPENING STATEMENT OF HON. ARLEN SPECTER, U.S. SENATOR FROM THE STATE OF PENNSYLVANIA

Senator SPECTER. Thank you, Madam Chairwoman.

I want to thank this distinguished panel of witnesses for coming in today. This is our third day of hearings, and we are examining the very complex issues involved in this legislation. It would be my hope that our committee would hold its fire until we have heard all of the witnesses and examined the key issues as to how we deal with global warming, climate change; how we protect the jobs that are at stake; how we deal with the electrical rates; and how we deal with the critical issue of freeing ourselves from dependence on foreign oil.

It is hard to avoid the heavy note of partisanship which has been present in these hearings. It would be my hope that we would look at the facts, be fact oriented. We all want what is best for America and reach a public policy decision.

I want to welcome especially John Rowe, who is the head of Philadelphia Electric Company. He is also the head of Exelon, I might add, which Philadelphia Electric is a part of.

Thank you, Madam Chairwoman.

Senator BOXER. Senator Inhofe.

OPENING STATEMENT OF HON. JAMES M. INHOFE, U.S. SENATOR FROM THE STATE OF OKLAHOMA

Senator INHOFE. Thank you, Madam Chairman.

I think we need to get on record here because we have talked about this before, and before we go into a markup, the Republicans on the committee think it is reasonable to get three things: the Chairman's mark of the bill, which we have and we thank you for providing that; a score of the Kerry-Boxer bill by the CBO; and a full economic analysis of your bill by the EPA.

Now, that is the thing that to me is the most significant because I think, you know, the people are entitled to know what it is that we have in this massive bill.

So we don't have the full economic analysis. This isn't just my view, but on Tuesday, Lisa Jackson, the EPA Administrator, when asked whether the EPA had conducted a full analysis, she clearly said no. So that is what we are going to have to have in this, and it is my understanding that you would tolerate three. You would prefer 2 minutes, so I will give the rest of my time to Senator Bond.

[The prepared statement of Senator Inhofe follows:]

STATEMENT OF HON. JAMES M. INHOFE, U.S. SENATOR FROM THE STATE OF OKLAHOMA

Today marks the third—and mercifully last—marathon session on the Kerry-Boxer bill. Before I address what we've learned about the Kerry-Boxer bill over the last 2 days, I want to talk about the next steps in the legislative process.

Chairman Boxer, before you move to a markup, the Republicans on this committee think it's reasonable that we get three things: (1) a chairman's mark of the bill, which we have—and we thank you for providing it; (2) a score of Kerry-Boxer by the Congressional Budget Office; and (3) a full economic analysis of your bill by the Environmental Protection Agency. Let me focus for a minute on the EPA analysis.

Madam Chairman, we don't have a full economic analysis. This isn't just my view. On Tuesday, Lisa Jackson, the EPA Administrator, when asked whether EPA had conducted a full analysis, she said, very clearly, "No."

Madam Chairman, I'll cut to the chase: let's work together and with the EPA to get the full analysis as well as the CBO score. Once we get them, we can proceed to a markup and take it from there. I know Senator Voinovich wanted to address these issues, so I'll move on.

Some in this room—well, maybe everyone in this room—will be surprised to hear that I've been eagerly awaiting this hearing. We've got an excellent lineup of witnesses. The Ohio Coal Association, the American Farm Bureau, and the American Trucking Association will explain why Kerry-Boxer threatens jobs and affordable, reliable energy, particularly in rural America. And we'll hear why the cap-and-trade system in Europe has been a failure.

I know my time is short, so I just want to emphasize the three important things we've learned about Kerry-Boxer over the last 2 days: It will undermine the global competitiveness of America's manufacturers, it will weaken America's national security, and it's an energy tax that will be paid for by the Heartland.

So I look forward to hearing from today's witnesses so we can learn even more about this bill.

Thank you, Madam Chairman.

Senator BOXER. OK. We will do that after we hear from Senator Cardin, and I believe Senator Alexander will follow.

Senator Cardin.

OPENING STATEMENT OF HON. BENJAMIN L. CARDIN, U.S. SENATOR FROM THE STATE OF MARYLAND

Senator CARDIN. Well, Madam Chair, thank you. This is, as Senator Specter pointed out, this is our third day of hearings. Yesterday, we started at 9:30. We finished a little before 6, and I thought the four panels were extremely helpful.

Today, we have four additional panels that I think will be helpful to us in understanding the importance of getting this bill passed, dealing with a new energy policy for America, for our security, for our economy, and for our environment.

I just want to talk about one aspect of the bill, and that is transportation. I have talked about transportation before, but I think transportation is a critically important part of the bill. Thirty percent of our greenhouse gas emissions come from transportation. Transportation consumes 60 percent to 70 percent of our oil.

This legislation recognizes the importance of transforming our transportation system by investing in clean fuel so that we can develop new types of liquid fuel such as ethanol from algae. I mention that because work is being done on that in Baltimore, and we are proud of the work that is being done in regards to clean fuels.

The legislation also invests in clean vehicles. I was pleased to see this week Senator Carper and Vice President Biden talking about electric cars in Delaware. I am proud of the people of Maryland that are going to help build those cars. The General Motors hybrid buses being done in White Marsh, Maryland, the Mack hybrid trucks in Hagerstown, Maryland—these are all examples of clean vehicles that I think will be part of our solution for our energy policy in America.

The bill also invests in CLEAN-TEA or transit. We live in the second most congested area in the Nation, Washington, DC. It is estimated that on average, a person spends 62 hours and 42 gallons of gasoline a year stuck in congestion here in Washington. If we double the transit ridership of this Nation, we can reduce our imported oil by 40 percent.

As Secretary LaHood said before this committee, it is about where we invest for America's future. This bill invests in clean energy, clean technology, to build our economy, to make us more secure, and to be the right stewards of our environment.

I look forward to hearing from the witnesses.

Senator BOXER. Thank you.

Senator Alexander.

OPENING STATEMENT OF HON. LAMAR ALEXANDER, U.S. SENATOR FROM THE STATE OF TENNESSEE

Senator ALEXANDER. Thanks, Madam Chairman.

I, too, look forward to the panel, and I thank you for coming.

We have a difference of opinion about how to address climate change, just speaking for myself. I don't have any problem with the problem. I think it is real. I have a problem with the solution. I think the economy-wide cap and trade is taxes, mandates, surprises and unnecessary. The costs will drive jobs overseas looking for cheap electricity. Applying an economy-wide cap and trade doesn't work because it raises the price but doesn't reduce the carbon by much. Manufacturing doesn't need this burden.

And if we are going to encourage different kinds of energy, instead of having a national windmill policy, we ought to have a national carbon-free energy policy and have parity among the different forms of energy.

So instead, all 40 Republicans, and I believe many Democrats, would agree to the following four points as a way to reach our climate change goals by 2030. One, create an environment in which we can build 100 new nuclear power plants, just as we did between 1970 and 1990. Nuclear produces 70 percent of our carbon-free electricity.

No. 2, electrify half our cars and trucks in the next 20 years. We could do that without building one new power plant, according to the Brookings Institution and the Obama administration. Plug them in at night.

No. 3, explore offshore for low carbon natural gas, as well as our own oil.

And No. 4, four mini-Manhattan Projects to carbon recapture, make solar costs competitive, make electric batteries better, and recycling nuclear fuel so we don't isolate plutonium.

If we did that, we wouldn't need a national energy tax. We wouldn't need to raise the price of gasoline. We wouldn't need to run jobs overseas, and we wouldn't need to have 170 billion taxpayer dollars subsidizing wind developers to build 186,000 50-story wind turbines in an area the size of West Virginia over the next 20 years.

Thank you, Madam Chairman.

Senator BOXER. Well, let us know what you really think about that.

[Laughter.]

Senator ALEXANDER. If you would give me more than 2 minutes, I would.

Senator BOXER. Well, any time.

[Laughter.]

Senator BOXER. Let's see—Senator Lautenberg.

OPENING STATEMENT OF HON. FRANK R. LAUTENBERG, U.S. SENATOR FROM THE STATE OF NEW JERSEY

Senator LAUTENBERG. Yes. Thanks, Madam Chairman, and welcome everybody.

The hard roadwork is underway, as you see. And one thing that I look for in the different differing views here is what is it that our mission is? How serious is the mission? And I think we have to look for ways to figure out how we get there.

But not once have I heard here about the importance of getting a bill underway, about the importance of reducing carbon exposure, of how we can work together, instead of these dilatory things that always find a way to impede progress, and that is what we are hearing now, for another review by the CBO.

And I look to my State, New Jersey, the most densely populated State in the Union. We had the Chairman of our big utility, Public Service Electric and Gas, here. And we now can attribute job availability having improved by 28,000 jobs. We don't want people to lose jobs. That is not the mission.

And no matter how they try to color it on the opposition to getting something done, it doesn't play the game. It doesn't get near what our mission is, a sacred mission to say to our kids that we are going to work hard that you are healthy in years ahead, and let that be the guiding light, and work under that umbrella and say, OK, now we have got to have a solution to the problem.

And I would love to hear our colleagues from the other side, I know they love their kids just as much as we love our kids. It is just that I don't think they realize the urgency of the problem or are unwilling to accept it.

Thank you.

Senator BOXER. Thank you, Senator Lautenberg.

Senator Bond.

OPENING STATEMENT OF HON. CHRISTOPHER S. BOND, U.S. SENATOR FROM THE STATE OF MISSOURI

Senator BOND. Thank you, Madam Chair.

Yesterday, we talked about how Kerry-Boxer offers $133 billion less than Waxman-Markey to protect against higher power bills. A closer look reveals many other ways Kerry-Boxer fails to protect consumers.

This chart shows how Kerry-Boxer fails to protect electricity consumers from higher power bills. While Kerry-Boxer provides consumer protection early in the program, funding shown here in blue declines quickly over the years and runs out completely less than halfway through the bill. Consumers are left exposed, while cap and trade drives electricity rates higher, the red line here, up to 42 percent higher in Missouri by 2020 and 48 percent higher across the country by 2050.

This chart here shows how Kerry-Boxer fails to protect workers. Again, there is a rebate program for energy intensive, trade exposed workers, shown here in blue. What workers need is shown here in the red line. However, Kerry-Boxer quickly cuts worker protection funding and eliminates it entirely by 2034.

So after a few years of Kerry-Boxer, worker protection is not enough, and for half of the bill, Kerry-Boxer leaves workers totally exposed to losing jobs. That will also fail to protect farmers. Fertilizer producers are relying on this program, but its failure will force energy production overseas to cheaper countries like Russia. Do we really want to make U.S. farmers dependent on Russian fertilizer?

Some also reference the so-called price collar to protect against rising energy prices. However, what Kerry-Boxer sponsors do not admit is that while they start the price control at a modest $28 per ton, they have a formula in the bill that sends the price skyrocketing.

Every year, Kerry-Boxer adds 5 percent to 7 percent plus inflation to the price collar so that by 2020, it is at $50 per ton, over $100 per ton by 2030, and $200 per ton by 2035. The red line here, showing the collar going through the roof. The blue line below is the estimated price of cap and trade. So since price control is actually higher than the projected price, in no year will it actually help control prices.

Finally, cap and trade represents a giant $3.6 trillion gas tax on America's drivers, farmers, truckers and small business. Senator Hutchison and I recently put out a report documenting this gas tax, and Barbara Windsor, head of a local regional trucking company, joined us when we released this report and will testify later today on how the cap and trade tax will hurt truckers.

Our analysis is simple: multiply the price per gallon from cap and trade times the amount of fuel America is expected to use. As the chart shows, cap and trade will impose what feels like a $3.6 trillion gas tax on gasoline, jet and diesel fuel. And I will submit the rest of my statement for the record.

[The prepared statement of Senator Bond was not received at time of print.]

Senator BOXER. Thank you.

I ask unanimous consent to place into the record a letter from AARP, National Consumer Law Center, Public Citizen, and Consumer Union: "Dear Senator Boxer, we are writing to commend you for your leadership on protecting residential consumers in S. 1733," and put the letter in the record.

[The referenced information follows:]

AARP
NATIONAL CONSUMER LAW CENTER®
Public Citizen
Consumers Union
NONPROFIT PUBLISHER OF CONSUMER REPORTS

October 27, 2009

The Honorable Barbara Boxer
Chair, Environment and Public Works Committee
United States Senate
Washington, DC

Dear Senator Boxer:

We are writing to commend you for continued leadership on protecting residential consumers in the Clean Energy Jobs and American Power Act, S. 1733. Reducing greenhouse gas emissions presents both a challenge and an opportunity that could transform the lives of many consumers. One of our organizations' top priorities for climate change legislation is to mitigate the cost impact on consumers, particularly low and fixed income households. S. 1733 includes several significant consumer protection provisions advocated by our organizations.

Both the Chair's mark for S. 1733 and H.R. 2454 allocate emissions allowances for free to various entities, including "local distribution companies" (LDCs). The LDC allocations are intended to benefit utility customers. However, H.R. 2454 includes provisions that guarantee that the value of LDC allowances be used to reduce utility bills for industrial customers only, and does not provide a similar explicit guarantee for residential customers. Your inclusion of language giving parity to residential ratepayers on the direct pass-through of free allowances helps to ensure more transparent and robust cost mitigation to ratepayers, including those on low and fixed incomes.

We understand that a portion of the value of the allowances given to LDCs may be used for energy efficiency initiatives. We urge you to include language requiring such initiatives include low-income ratepayers and be cost-effective, measurable and verifiable to ensure true consumer benefit.

We are very pleased that S. 1733 strengthens the establishment of the Office of Consumer Advocacy that is included in the House bill. We agree that this office should be empowered to address long-term climate change policy and its impact on consumers and intercede on their behalf as needed. However, we are concerned that an assured funding stream is needed to guarantee this important consumer protection, and we urge you to include a dedicated funding source in your legislation

We believe the need to provide and preserve a strong, transparent, and meaningful role for consumer participation in federal and state utility commission proceedings requires new provisions for intervener compensation. This substantial consumer benefit could be funded with less than a portion of the proceeds from one allowance already set aside for consumer benefit

Finally, we ask that you lend your vigorous support and voice to expand the auction set-aside for direct relief to low-and moderate-income consumers. The Chair's mark states that the Energy Refund Program is for low- and moderate-income households, which we applaud, but the allowances for the program are less than 13% of the total emission allowances versus the 15% in H.R. 2454, which was dedicated solely to cover the lowest income households. It is important that sufficient funding be made available to adequately cover these low-and moderate-income households.

We look forward to continuing to work with you to develop climate change legislation that provides meaningful mitigation of utility cost increases for all consumers, especially those on low and fixed-incomes, seniors and the working poor.

Sincerely,

David P. Sloane
Senior Vice President
Government Relations and Advocacy
AARP

Olivia Wein
National Consumer Law Center
On behalf of its low-income clients

Tyson Slocum
Public Citizen

Shannon Baker-Branstetter
Consumers Union

cc: Senator Ben Cardin

Senator BOXER. And I want to say now that Senator Klobuchar is going to speak; she has been taking the lead, and we are going to continue to work on this as we move forward.

Senator Klobuchar.

OPENING STATEMENT OF HON. AMY KLOBUCHAR, U.S. SENATOR FROM THE STATE OF MINNESOTA

Senator KLOBUCHAR. Thank you very much.

And thank you to the witnesses.

I just wanted to thank you, again, Madam Chair, for convening these long hearings with eight panels and 50 witnesses. I just wanted, with Bob Stallman here, to acknowledge the agriculture work that is still going on with this bill. You know, the agriculture Senators are going to work on this outside of this committee and bring forward some ideas to the floor.

But I will say in this bill—we did increase the proportion of domestic offsets in the bill from 50 percent in the House bill to 75 percent in this bill. This is good for our agriculture and forestry sectors because it will result in more opportunities for our farmers, who are also able to increase allocation of the allowances from .2 percent in the House to 2 percent for the first 2 years, and [unclear] percent for the entire life of the bill.

So we are working very hard on the agriculture issues, seeing farming as part of the solution here. Farmers grow things. That is good for the environment. We want to do it the right way.

So I am looking forward to hearing from the panelists.

Thank you very much.

Senator BOXER. Senator Voinovich.

OPENING STATEMENT OF HON. GEORGE V. VOINOVICH, U.S. SENATOR FROM THE STATE OF OHIO

Senator VOINOVICH. Thank you, Madam Chairman.

Serious problems deserve serious solutions. This bill lacks analytical support and open dialogue. Even much less significant or costly bills are subject to EIA and EPA analysis well in advance of the final committee actions. Lesser bills are subject to legislative hearings; not so here. Lesser bills are designed to meet somewhat realistic assumptions about the real state of technology. Not so here.

I would like to put in the record an editorial from the Post referencing Senator Cardin, called The Public Fisker: Washington Can Help Build Plug-in Hybrids, But Who Will Buy Them? At the end of the article, it says, "Such are the risks of the Obama administration policy which seems to be fertilize the fields of green technology and hope at the end at least some of it sells."

This may be the single most significant piece of legislation that has come before the committee, touching every sector of the economy and having immense energy, economic, environmental and national security consequences. At this point, we do not fully understand how this legislation will impact on the price, supply and reliability of electricity, gasoline and other commodities which millions of Americans depend on every day.

Once more, we don't know if the bill will have an appreciable impact on climate change. On Tuesday, Administrator Jackson admitted that they had not done a complete analysis of this bill. We are talking about a bill that is going to go to 2050. You would think that we would wait for that data.

Madam Chairman, I have a Washington Post article, Economics of Climate Change at the Forefront. I will submit that, which talks about the argument over estimates.

[The referenced information was not received at time of print.]

Senator VOINOVICH. The best information that we have right now is an analysis by the American Council for Capital Formation, which says this bill is an economic disaster. The fact of the matter is if you look at this bill, for examples, States like Ohio are going to get 70 percent of our allowances taken care of, and your State of California is going to get 140 percent. That means a shifting of $385 million from some States to other States around the country.

And I have a poster here, a chart. If you see the votes in the House, folks, these are the people who voted against the bill in the House. Here are the States of the people who voted for it in the House. And you can see the regional differences in the United States. Here we are. I am in the Midwest, the manufacturing sector of this country, and we have problems with it. But those over here, they think it is OK. California is going to make out like a bandit with this legislation.

So Madam Chairman, I think it is time that we—I am going to finish up.

Senator BOXER. You can ask unanimous consent for a minute if you want.

Senator VOINOVICH. All right. I think that we need a sense of bi-partisanship in this committee, and I don't think we have it. You complained the other day that Senator Warner is no longer on the committee.

Senator BOXER. I did.

Senator VOINOVICH. I ask, does your definition of bi-partisanship mean someone that agrees with you? I mean, this is a big bill. We need to really get at it. I am willing to work with the people on the other side of the aisle, but to jam this thing through here is not going to be good, and America is going to be very, very upset about it.

And I will tell you one thing, the people in Ohio will be very upset about it.

Senator BOXER. I will take my 2 minutes now.

If you had asked for unanimous consent, I would have been happy to grant it.

Now, here is my definition of bi-partisanship: working together like we do on the highway bill, like we do on the water bills. We know how to work together. Senator Inhofe and I are working together right now, along with other colleagues. We would have had an extension of the highway bill, Senator Voinovich. You were the only one on this committee to object to it.

Now, here is the situation. I think the speech you just made is flat wrong, and I want to explain why. I have the EPA analysis, and they say there are barely any regional differences whatsoever.

Senator VOINOVICH. It is not a complete analysis, and the head of the Department said it is not a complete analysis.

Senator BOXER. I did not interrupt you, Senator.

Senator VOINOVICH. Well, you are editorializing on my comments as you do everybody else's comments here.

Senator BOXER. Senator, I am taking my time because I didn't take my 2 minutes in the beginning. I am taking it now.

Senator VOINOVICH. Thank you.

Senator BOXER. Thank you very much.

I will ask unanimous consent to place into the record the EPA analysis, which says there are barely any regional differences, as well as put into the record the amount of extra costs for consumers which we are trying to offset.

[The referenced information was not received at time of print.]

Senator BOXER. Now, I hear what you are saying, all of you, on the other side. I have done everything possible to get some of you on the other side to work with us. I praised the meetings I had with Senator Voinovich in my opening statement. He said he wanted to meet, and we met. We have notes from that. He asked us for an analysis. We made it just for him. So to say that we haven't reached out is ridiculous.

Now, we are having an unprecedented number of legislative hearings. All of these witnesses, we have asked them to read the bill in its entirety. We have asked every witness to do so, and they are prepared to speak about the bill either for or against the bill.

And we have an analysis that I would say is one of the most thorough ever done, and this is the reason why. Five weeks to do the Markey bill, 2 weeks to do the tweaks that we did. Most of our bill is very similar to theirs. So it is a 7-week process.

And as far as the CBO, we have been working hand in glove with them to make sure that our bill is in fact deficit-neutral and maybe even has a surplus. It is the tradition of this committee that the CBO score is done after the mark, before the bill is on the floor. That is what this committee did under Republican leadership and Democratic leadership. And that is what we will do.

I hope we don't see a boycott of the markup of a landmark bill. That would be tragic, in my mind. We are ready to look at your amendments. We are ready to work with you on your amendments. We are ready to accept them if we feel they are good, and have votes on them, and you know, who knows how the votes will turn out?

But all of this aggressive kind of argument I just think is misplaced. If you go back, and I have, to the history of this committee under Republican leadership and Democratic leadership, we are doing a tremendously thorough job, and I am very proud of the work that has come out of this committee.

And all of the charges I hear from the other side just don't hold up in the light of day. There is just fear mongering going on, and the fact is we are going to look at a bright new future if we move forward.

So let's just continue, and we will go now to Senator——

Senator INHOFE. Let me respond, if I could. I will take my second minute that I didn't use.

Senator BOXER. You have a minute left over.

Senator INHOFE. Thank you very much, Madam Chairman.

Let me just say this, in terms of the analysis and the time, let's be realistic about it. When we had the Clear Skies legislation, we started our first hearing in April 2003. We had them in May, June, July, all the way through the rest of that year, into February 2005. Finally, we ended up having a markup on March 2005.

We had 2 years of analysis. We had 10,000 pages of analysis. And all of a sudden, it is outrageous for us to ask for even 2 months of the same thing.

So I think we need to look back to what we did when we were a majority on very similar type of legislation, Clear Skies, and it took 2 years before we could even have a markup.

Senator BOXER. Senator, I so respect what you said, but we will have this. When we start our markup, we will put on the table the 50 different modeling efforts that went into this, the 3 years of hearings, the panels of which we have three more today.

Senator Whitehouse.

OPENING STATEMENT OF HON. SHELDON WHITEHOUSE, U.S. SENATOR FROM THE STATE OF RHODE ISLAND

Senator WHITEHOUSE. Thank you, Chairman.

Well, gentlemen, you see what we are up against.

I will stand by my earlier opening statement. I do want to particularly welcome Fred Krupp, who has done such good work for so many years in this area, and my old colleague, John Rowe, who was the head of the New England Electric System in New England back when I was doing my public utility work years ago. It is a pleasure to see you here.

We do look forward to working with any and every colleague who wants to work with us in good faith to solve problems that may be associated with this bill. The one thing I will say is that the pursuit of bi-partisanship should not and cannot lead us beyond the realm of reason, beyond the scope of science, and outside of the arena of good faith. But other than that, I think we are very open to discussion and to compromise.

And I look forward to this. We are at the very beginning of a long and continuing process, and I think it is a vitally important one that we succeed at.

Thank you, Madam Chair.

Senator BOXER. Thank you, Senator.

Senator Barrasso.

OPENING STATEMENT OF HON. JOHN BARRASSO, U.S. SENATOR FROM THE STATE OF WYOMING

Senator BARRASSO. Thank you, Madam Chairman.

I would like to bring the committee's attention to an article that ran in the British newspaper, The Telegraph, entitled Britain Faces Blackouts for the First Time Since the 1970s. The article stated that demand for power for homes and businesses will exceed supply from the national grid. That day is coming. It states that the gap between Britain's energy needs and demand throws fresh doubt on the government's assertion that renewable energy can make up for dwindling nuclear and coal capabilities.

That could be the same result here in the United States if this House and Senate pass the Boxer-Kerry energy tax bill.

The ideas that we are looking at say we need to eliminate our baseload power, power that runs 24 hours a day, 7 days a week, meaning coal and natural gas and nuclear and hydropower. Some want to replace that power with intermittent wind and solar power, power that runs some of the time, but not all of the time. When the sun doesn't shine or the wind doesn't blow, the lights will not turn on.

Someone on this committee just yesterday stated that a massive energy tax will unleash the American economy. History shows it will unplug it. An Investor Business Daily article entitled, Nuts to Copenhagen, highlighted the current unemployment in Spain. The article says Spain has been the green jobs success story, the example of what a green economy should look like. Well, the article then quotes someone from the U.K. Telegraph as saying, "Spain is sliding into a full blown economic depression, with unemployment approaching levels not seen since the Second Republic of the 1930s."

According to the CBO Budget Director, the results of the U.S. adopting these policies will be millions of jobs lost. Dr. Elmendorf has stated that the fossil fuels sector would mirror the massive job losses experienced by manufacturing industry beginning in the 1970s. The Rust Belt experience will be repeated in communities across America if this bill becomes law.

Dr. Elmendorf's forecast for the U.S. is echoed in the Wall Street Journal editorial.

I ask, as you said, we can go an extra minute. I ask unanimous consent for one additional minute. I could do it in 30 seconds.

The editorial stated, "Cap-and-tax, this is a cap-and-tax delay," written in the Wall Street Journal, "cap-and-tax will most hurt the rural and Midwest States that rely on coal-fired power and heavy manufacturing." The editorial went on to state that "This energy tax bill is a huge new tax on carbon energy whose revenue will largely flow to the wealthier East and West Coast. Delaying the bill would be a major victory for the U.S. economy." That is a quote from the editorial.

We need to unleash the American economy, not unplug it.

Thank you, Madam Chairman.

[The referenced information was not received at time of print.]

Senator BOXER. Thank you very much, Senator Barrasso.

Senator Udall, I believe.

Oh, Senator Carper, and then after Senator Carper speaks, he is going to speak again later when he introduces Dr. Kempton.

OPENING STATEMENT OF HON. THOMAS R. CARPER, U.S. SENATOR FROM THE STATE OF DELAWARE

Senator CARPER. Thanks, thanks very much.

To our panel, welcome. It is always interesting here. It is not always this exciting, and we are glad you could join us.

I just want to respond briefly, make my opening comments to say some of my colleagues will be pleased to hear that the last quarter's growth of GDP was 3.5 percent. And so I am very pleased to see what the Wall Street Journal reported on September 2nd. It will be interesting to see what they report today and tomorrow.

To one of my colleagues who discussed the prospects for success for a new plug-in hybrid vehicle, I would just ask you to wait until you see it. And the idea to have a vehicle that looks that good that gets 100 miles per gallon, I think they will sell just fine. And we are very hopeful that they will.

Climate change is the challenge of a generation, my generation, our generation. We need to take bold action. The actions we will take now will impact generations to come.

The best way I believe to bring jobs and prosperity back to our country is also the best way to end our dependence on foreign oil, clean up our air, protect the Earth for our children and for their children. By providing a technology-neutral cap on carbon, which is what Senator Kerry's and Senator Boxer's bills do, will harness the greatest source of power that we have in this country, that is American ingenuity.

Giving a clean energy market signal will drive the production of offshore wind turbines, solar panels, plug-in hybrids and nuclear power plants components right here in America.

Today, we will hear about some of the ingenuity. It is happening in Delaware regarding offshore wind, which can be replicated throughout our eastern and western shorelines, the Great Lakes, and the Gulf of Mexico.

Today, we will also be talking about the gains that flow from changing our transportation sector. As many of you know, I feel passionately that an economy-wide effort to reduce greenhouse gas emissions cannot be successful without significant reductions in transportation emissions. I want to applaud the Chair for including our CLEAN-TEA legislation in her bill and for providing up to 3 percent of allowances for clean transportation projects.

While I believe—in fact I would ask unanimous consent for another 30 seconds.

Senator BOXER. Yes.

Senator CARPER. While I believe transportation deserves more allowances, 3 percent is a significant down payment. For a sector of our economy, transportation, which produces 30 percent of the CO_2 emissions, it makes sense to me that we have a reasonable corollary in terms of allowances, and we are getting closer, so we are grateful for that.

But it is clear that the Chair understands the role that public transportation, commuter rail, Amtrak, freight rail and smart growth can play in climate solutions.

And with that having been said, I thank you for the extra 30 seconds and look forward to introducing a childhood friend of Tom Udall.

Senator BOXER. Is that right?

[Laughter.]

Senator BOXER. Senator Udall.

OPENING STATEMENT OF HON. TOM UDALL, U.S. SENATOR FROM THE STATE OF NEW MEXICO

Senator UDALL. Thank you, Madam Chair. It is great to be here today, and it looks like we have a very well educated, wonderful panel before us.

I am a little bit dismayed with the fear mongering we hear from the other side, talk about blackouts and those kinds of things. And it seems to me that what we should be looking at is what do—we face if we don't do anything. And those prospects, I think, should bring us all together as Democrats and Republicans.

You know, if we don't do anything and our economy starts growing again, we are probably looking at $4-plus gasoline again. And it will probably go higher. Nobody wants it to go there, but that is probably where we are headed. We are definitely headed in the direction of dependence on foreign oil and greater dependence. We are approaching 70 percent.

And so all of these things, and the road that we are headed down right now, have a big impact on our environment, a big impact on our economy, and as our panel showed us yesterday, and this is paramount, a huge impact on our national security being over-dependent on foreign oil.

So I would hope that we would step back from a little bit of the fear mongering that is going on and try to be deliberative. We know the Senate is this great deliberative body. We settle back and deliberate and try to come together as Democrats and Republicans, and we have a great panel, I think, to make some suggestions to us today on how to move forward.

So with that, I would yield back so that we can get to the panel.

Senator BOXER. So we are going to get to our panel. And we will start off with Preston Chiaro, Chief Executive Officer, Energy Product Group, Rio Tinto.

STATEMENT OF PRESTON CHIARO, CHIEF EXECUTIVE OFFICER, ENERGY PRODUCT GROUP, RIO TINTO

Mr. CHIARO. Madam Chairman, members of the committee, I appreciate the opportunity to appear here today.

As you said, I am Preston Chiaro, Chief Executive of Energy and Minerals for Rio Tinto. Rio Tinto is the largest diversified mining company in the U.S., with over 15,000 employees in this country. Our U.S. assets include coal operations in Colorado, Wyoming and Montana; copper in Utah; copper projects in Michigan and Arizona; borax in your home State, Madam Chairman, in California; talc in Montana and Vermont; and an aluminum smelter in Kentucky.

The energy intensity and the very long lives of our operations expose the mining and metals sector both to the effects of climate change, as well as climate change policies. Unmanaged climate change is a threat to our assets, our shareholders and our employees, and also to civil society and political institutions.

Rio Tinto is supportive of a strong global climate agreement for the investment certainty that it will bring. That will allow us to deliver value to our shareholders, products to our customers, and jobs for our employees.

Our corporate climate position asks us to engage with governments in the development of climate policy in all the jurisdictions where we operate, to reduce our own energy use and greenhouse gas emissions, and to find low emissions pathways for our products.

We engage both individually and through stakeholder groups, such as the U.S. Climate Action Partnership, which leverage our views and speak to the political center that is essential for a workable policy solution.

We focus on three features when discussing climate policy. One is accelerating the development and deployment of low emissions technology, including carbon capture and storage, also known as CCS. No. 2, minimizing the cost of climate policy. And No. 3, avoiding carbon leakage or the migration of emissions, jobs and industry from countries with regulations to those without.

So let me say a few words about each of these. On technology, the accelerated development and deployment of low emissions technologies can lower the cost of meeting future emissions goals. Coal currently provides one half of U.S. electricity, and CCS technology can transform coal into a low emissions fuel. But this effort requires support for CCS demonstrations, a regulatory framework for carbon sequestration, financial incentives for deploying up to 72 gigawatts of CCS, and a phased in performance standard which mandates CCS retrofits for all coal plants built from this point forward.

We would like to commend Senator Carper and his Coal Working Group for their continued efforts to accelerate CCS. Our own commitment to CCS is demonstrated by our investment in the Hydrogen Energy California project in Kern County, a commercial scale hydrogen-powered electric generating facility that, when it is fully operational in 2016, will sequester most of its CO_2 emissions.

And while I am talking about technology, I should point out Rio Tinto was the world's largest uranium producer last year. Nuclear power generates around 16 percent of the Nation's electricity, and it is a proven low emission energy source which we fully support.

Turning to costs, we believe integrated markets are unparalleled in their ability to leverage private sector investment and minimize the cost of emissions reduction. The Kerry-Boxer bill includes many key cost containment features, such as a broad, inclusive cap, banking and borrowing provisions, and widespread access to high quality domestic and international offsets. A continent-wide compliance market, starting with the United States and Canada, would be a great start in this direction.

Finally, carbon leakage is the threat from the migration of emissions, jobs and industry from countries with climate legislation to countries without. We support the Kerry-Boxer use of output-based rebates to prevent leakage, and ask the committee for a sufficient transition for energy intensive and trade exposed industries. The outlook for a strong global policy framework is dim if it jeopardizes our industrial competitiveness.

So in summary, we urge you to retain and support the features of support for low emissions technologies, cost minimization, and avoidance of leakage in any legislation as it works its way through the Senate.

Thank you.

[The prepared statement of Mr. Chiaro follows:]

Testimony of Preston Chiaro on behalf of Rio Tinto

Before the Senate Environment and Public Works Committee

Legislative Hearing on S. 1733, Clean Energy Jobs and American Power Act

29 October 2009

Madame Chair and members of the Committee, I greatly appreciate the opportunity to testify today. My name is Preston Chiaro, and I am Chief Executive for Energy and Minerals for Rio Tinto, the largest diversified mining company in the US, and one of the largest diversified mining companies in the world. Our US assets include coal holdings in Colorado, Wyoming, and Montana, copper in Utah, copper projects in Michigan and Arizona, borates in California and talc in Montana and Vermont, as well as an aluminum smelter in Kentucky, with over 15,000 US employees all told.

Rio Tinto believes that emissions of greenhouse gases from human activities are contributing to climate change and that avoiding human caused changes to the climate is an important international goal. The mining and metals sector is exposed both to the effects of climate change and to climate change policies. This is because:

- We produce for the most part commodity products, which are dependant on global markets.
- Our business is very capital intensive, and operations are very long lived – investments are typically made looking 20, 30 or more years forward.
- Many of these operations are very energy-intensive, and successfully addressing climate change requires fundamental changes in the way the world produces and consumes energy.

Unmanaged climate change is a threat to our assets, our shareholders, and our employees, and also to civil society and political institutions in many of the countries in which we operate and across the globe. Rio Tinto is supportive of a strong global agreement on climate change. A strong global agreement can provide the economic, social, and political stability, and hence the investment certainty, that allows us to deliver value to our shareholders, products to our customers, and provide jobs to our employees.

As a consequence, our corporate climate policy since 2003 has been to partner with governments in the development of climate policy in all jurisdictions in which we operate, to reduce energy use and GHG emissions in our own operations, and to find low emissions pathways for all of our products. We have engaged both individually and through groups of like-minded stakeholders, such as the US Climate Action Partnership (USCAP) which we joined in 2007, and the Canadian Environmental NGO-Industry Cap and Trade Dialogue, which formed only recently and includes our Canadian aluminum, iron ore, titanium dioxide, and diamond businesses and the Canadian businesses of some of our fellow USCAP companies. Our work through groups such as these allows us to leverage our views and collectively speak to the center of the political spectrum that is so essential for achieving a sustainable policy solution.

In all of the jurisdictions where we operate, we tend to focus on three features of climate policy that need to be addressed at both a national level and in a global context. A global framework is ultimately essential because the challenges which we would like to address in a US context today are faced elsewhere as well. These features will provide for:

- Accelerating the development and deployment of low emissions technologies. Carbon capture and storage will play a very important role in coal-dependent countries like the United States,
- Minimizing the cost of climate policy through market mechanisms and other cost containment provisions, and
- Avoiding carbon leakage through transitional compensation for energy-intensive, trade-exposed (EITE) industry.

Low emissions technologies

The role of technology is to reduce the cost of meeting our future emissions targets. Deployment of existing low-carbon technologies, including nuclear power, energy efficiency, and renewable generation technologies, is absolutely essential but existing technology is not sufficient for reaching the aggressive targets set in Waxman-Markey and that Kerry-Boxer and the Administration advocate. Government incentives for the accelerated development and deployment of low emissions technologies will be critical, including low-emissions energy and industrial technologies. Our advocacy for the funding of low-carbon technologies is not an argument against the level of the targets, which we believe are consistent with the USCAP recommendations and are required in order to address the climate imperative. Rather, the funding of low-carbon technologies is intended to ensure we reach those targets at as low a cost as possible.

Under a climate-constrained world we will have to change the way that we produce and consume energy, and this is no more evident than in the way we use coal, the fuel supplying about half our own electricity and 40 percent of global electricity. The coal challenge faced by the US is the same one faced by coal-dependent economies around the world, although the situation is even more complex for developing countries seeking to provide electricity at low cost to 1.6 billion people currently living without it. Our own commitment to the domestic use of CCS is demonstrated through our company's investments in projects such as the Hydrogen Energy project in Kern County, California. Hydrogen Energy has proposed a new hydrogen-powered electricity generation facility for the Kern County area that, when fully operational in 2016, would store most of its carbon-related emissions.

Coal-based energy will play an outsized role and it provides an important challenge because of the volume of emissions associated with its use. We feel the USCAP coal recommendations stand the best chance of transforming coal into a low-emission energy source. The USCAP recommendations, which are fully reflected in both Waxman-Markey and Kerry-Boxer, include support for carbon capture and storage (CCS) demonstration plants, the development of a regulatory framework for carbon sequestration, financial incentives for deploying up to 72 GW of CCS, and a phased-in performance standard with a mandatory retrofit for all coal plants built this year forward.

Cost containment

A global approach will rely on global carbon markets to transmit price signals for GHG reductions as broadly as possible. In fact, commoditizing carbon is the best path forward to minimize the cost of achieving GHG reductions, as businesses like our own will treat carbon like any other input cost, and seek to reduce that cost. Trading across jurisdictions via integrated markets will help to reduce costs even more, allowing for greater progress towards an overall target. Integrated carbon markets can provide an important vehicle for developing countries to join global efforts to reduce emissions. In particular, we see great mutual advantage from a continent-wide GHG compliance market, beginning with the US and Canada. This larger market will enhance the liquidity of both systems and represents an important step in the direction of developing a strong global framework.

Some observers invariably question whether we should trust markets with such an important task. We believe that we need strong markets in place precisely because it is so important for our efforts to be successful. Markets are unparalleled in their ability to leverage and direct private sector investment, integrate all available information, and help participants to understand market expectations through price signals, share risk, and in the process minimize the marginal costs of reducing GHG emissions. As a commodity producer, we are naturally very comfortable with commodity markets and prefer this approach to government mandates. We feel that the problems with markets are largely known and can be addressed with strong oversight and market regulation. Where markets may fail to address important issues such as carbon leakage, the necessary remedies are well understood, and we stand ready to work with the chairman and the committee to explore these options.

The Kerry-Boxer bill includes many of the key market features that we would like to see such as a broad, inclusive cap and compliance flexibility through banking and borrowing. These and other features in the bill will keep prices from getting so low that they discourage investment or from getting so high that they lead to larger economic dislocation and generalized demand destruction. We also support the bill's widespread access to domestic and international offsets to help contain costs, and the development of rigorous measurement, monitoring, reporting, and verification (MRV) procedures to ensure that offsets are high-quality, and feel that these will ultimately be far more successful at reducing emissions than any arbitrary limitations on the use of offsets.

Transitional compensation for Energy-Intensive and Trade-Exposed industry

The final globally-based policy feature that needs to be in place in US domestic policy is some safeguard against carbon leakage. Carbon leakage is the migration of emissions, jobs, and industry from countries with carbon regulation to countries without regulation. Climate policy leaders in both EITE industry and the environmental community have found common ground in calling for nations to recognize and adjust for first-mover costs in order to prevent leakage. We support the Waxman-Markey and Kerry-Boxer use of output-based rebates for EITE industry, and feel that when a globally level playing field returns, competitive advantage should be on the basis of uncompensated carbon cost.

Because the problem of leakage will diminish as we move towards a strong global framework, the support should be considered transitional in nature, and not viewed as a permanent solution. In Australia and elsewhere, we advocate for transitional compensation to last until 80 percent of an industry globally is covered by comparable climate policy.

Other Approaches to Markets, Technology, and Preventing Carbon Leakage

We expect to see continued efforts to promote alternatives to the market- and technology-based policies that we see as critical for success, and that likewise some see trade-based measures as a possible solution to prevent leakage. These alternatives are obviously well-intentioned, and appeal to certain constituencies. However, the alternatives fare poorly when projected onto the entire economy, and even worse when projected globally.

Regarding markets, we all realize that it is not sufficient to put a market in place and hope for the best. Markets need a clear set of rules and strong oversight to implement these rules. Congress is well positioned to consider what these rules should look like and provide appropriate jurisdictional oversight.

Others will suggest that command and control methods may be superior at implementing the latest abatement technology. We argue that markets by themselves will tip the private sector's decisions toward low-carbon technologies at lower cost than command and control approaches. Moreover, markets will be more successful than command-and-control at developing the new technologies we need.

To address leakage concerns, there is an alternative proposal for avoiding the loss of energy-intensive and trade-exposed industry to unregulated jurisdictions, called a border adjustment measure. Section 765 of the Kerry-Boxer bill is clearly a placeholder for such a provision. Rio Tinto is highly skeptical of border adjustments' ability to play a constructive role within a global deal. Border adjustments risk protectionism, retaliation from targeted countries, and the risk of protracted WTO litigation. Border measures would not promote freer world trade, or consensus building in global climate dialogues. For that reason, our first preference is for allowance-based rebate measures for preventing leakage.

Conclusions

Rio Tinto will continue to urge governments to negotiate a strong global agreement for addressing climate change. We are pleased that the market-based policy features which we have advocated, including incentives for the accelerated development and deployment of low emissions technologies, a variety of cost containment mechanisms, and transitional compensation for EITE industry are largely present in the Kerry-Boxer bill. We urge you to retain and support these features in any legislation as it works its way through the Senate.

Senator BOXER. Thank you so very much.

And second, we turn to John Rowe, Chairman, President, and Chief Executive Officer of Exelon Corporation.

Welcome.

STATEMENT OF JOHN ROWE, CHAIRMAN, PRESIDENT, AND CHIEF EXECUTIVE OFFICER, EXELON CORPORATION

Mr. ROWE. Thank you, Madam Chairman, members of the committee.

I am Chairman of Exelon, which operates retail companies serving 12 million people in Northern Illinois and Eastern Pennsylvania with electricity. We also operate one of the Nation's largest generating companies, which includes 17 nuclear units, by far the Nation's largest fleet, and we are very proud of that. We produced Exelon 2020, to the best of my knowledge the only plan in the industry to reduce, offset or otherwise neutralize our carbon footprint by 2020.

Exelon is a member of USCAP. I have served as a co-chair of the National Commission on Energy Policy, and I am a past Chairman of both the Edison Electric Institute and the Nuclear Energy Institute. I am proud to say that each of these organizations has supported in concept a cap and trade system to meet the challenge of climate change, although my testimony today is only on behalf of Exelon.

We believe we need an economy-wide bill with realistic targets and timetables. We believe that because we think it will be the lowest cost solution to the climate challenge. We think we need an effective cost containment mechanism and allocation mechanisms that give allowances to local distribution companies to minimize the early cost to consumers.

Exelon submits that the bill proposed by Chairman Boxer and Senator Kerry, as well as the Waxman-Markey legislation, each constitute a very good beginning, although we hope certain alterations will be made.

From our standpoint, the most critical thing is the cap and trade system, and with the greatest respect for those colleagues who support nuclear and also those people here who support renewables, we have spent a great deal of time looking at the cost of various ways to reduce carbon.

In Exelon 2020, and the key data is in our written submission, we attempted to the best of our ability to analyze the cost of each major way of reducing carbon emissions. The low cost ones are clear. They are energy efficiency. They are upgrades in existing nuclear plants. And they are more electric generation with natural gas. That is simply clear at the present time. The higher cost ones are renewables, my own favorite, more nuclear energy, and coal with carbon sequestration.

Ladies and gentlemen of the Senate, we very respectfully submit that this problem must be dealt with, and we must deal with it with a mechanism that uses the market to hunt for the lowest cost solutions. This economy cannot afford to do everything the high cost way.

Now, we believe that there are firm safeguards that can help address some of the objections that have been raised to cap and trade.

We support the allocation of 40 percent of the allowance to local distribution companies. We do that entirely because it benefits our customers. We support a definitive price collar on allowances. Again, we don't want the economy to be speculating about how much this will cost in the early years. We need to know. While we would like to see it made more firm, we applaud the Chairman for endorsing a price collar in the bill.

And with that, I thank the committee and the Senate for taking this whole issue seriously. Energy is important. Climate is important. And we can deal with this in a way the Nation can afford.

[The prepared statement of Mr. Rowe follows:]

Testimony of John W. Rowe
Chairman and Chief Executive Officer
Exelon Corporation
Before the Committee on Environment and Public Works
United States Senate
October 29, 2009

Madam Chairman and Members of the Committee:

My name is John W. Rowe, Chairman and CEO of Exelon Corporation. I appreciate the opportunity to appear before you today. Exelon is headquartered in Chicago and our retail utilities, ComEd in Chicago and PECO in Philadelphia, serve 5.4 million customers, or about 12 million people – more than any other utility company in the United States. We also have a significant presence in New Jersey and in Texas. We have nuclear, fossil, hydro, and renewable generation facilities. Our nuclear fleet is the largest in the nation and the third largest in the world.

Exelon supports passage of comprehensive legislation to address the greenhouse gas issue. We need an economy-wide bill with realistic targets and timetables, an effective cost-containment mechanism, and an allowance allocation mechanism that awards allowances to electricity delivery companies to prevent dramatic consumer rate increases. Without prompt action, our industry will be caught in a carbon purgatory: we will lack the certainty we need to make the large-scale investments in clean generation that are necessary to both keep the lights on and meet the challenges associated with climate change.

I am the longest-serving CEO in my industry, having served in that capacity with a succession of companies since 1984. Exelon is pleased to be a member of the United States Climate Action Partnership (USCAP). I chair, or have chaired, the Nuclear Energy Institute (NEI), Edison Electric Institute (EEI) and the bipartisan National Commission on Energy Policy (NCEP). I am proud to note that each of these organizations has endorsed passage of comprehensive legislation to address the climate change issue.

I first testified in favor of tackling climate change before the House Energy and Power Subcommittee in 1992 when I was the CEO of another utility. Exelon was an early and vocal advocate of climate change legislation. We have testified in favor of passage on several occasions. We believe that the climate change science is settled, as exemplified by the comprehensive work of the National Academy of Sciences and the United Nations Intergovernmental Panel on Climate Change. The IPCC has declared that evidence for a discernable warming of the planet's climate system is now "unequivocal" – and has warned that much larger changes are in store if we don't begin reducing global emissions of heat-trapping greenhouse gases and do it soon. We simply must take action now to address the problem. The longer we wait to start, the more expensive and more difficult it will be for our economy and our citizens to deal with the problem. I implore the members of this Committee to redouble your efforts to pass a bill that slows, stops, and ultimately reduces greenhouse gas emissions while protecting the American economy.

Exelon is not waiting to address this growing danger. Last year we produced "Exelon 2020," our company's program to reduce, offset, or displace our entire carbon footprint – some 15 million tons annually by 2020. Earlier this year, we announced that we have achieved one-third of our goal by reducing nearly 6 million metric tons of carbon dioxide equivalent – equal to taking more than a million cars off the road. Our entire "Exelon 2020" plan is available on our website (www.exeloncorp.com).

Exelon 2020 includes an analytical framework for assessing the cost of reducing greenhouse gas (GHG) emissions for Exelon, our customers and the markets we serve. It shows the most and the least cost-effective ways for Exelon to address the greenhouse gas problem. The analytical results are attached to this testimony. Our analytical framework graphically shows that some ways of reducing greenhouse gases are less expensive than others. For example, the cost of reducing greenhouse gases in energy efficiency programs offered by our utilities, ComEd and PECO, ranges from -$50.00 to $9.00 per ton. New wind generating capacity ranges from $45 to $80 per ton depending on the location. New nuclear generating capacity is $75 per ton. A new integrated gasification combined cycle plant with carbon capture and sequestration costs $160 per ton. Adding new solar photovoltaic generating capacity costs more than $700 per ton. These numbers do not include the effect of tax incentives or subsidies. One of the most important aspects of cap and trade legislation is that it would encourage pursuing the least expensive options first.

Exelon believes that the Waxman-Markey bill that passed the House and the proposed Kerry-Boxer bill before this Committee each constitute a good start toward a cost-effective, efficient, market-based response to the climate change challenge. A cap and trade system similar to those contained in these bills incents companies like ours to find the lowest cost solutions to the climate problem. We should reward low cost solutions rather than mandating higher cost solutions, whether those are renewable, carbon capture and sequestration or my own favorite, nuclear energy. Again, this is the idea behind our Exelon 2020 plan. A cap and trade program will force this outcome because of its competitive market nature; it will require that alternatives compete on a price basis. Climate change legislation should be designed to encourage low-cost solutions. Command and control options do not impose the discipline of the marketplace on solutions. They encourage ad hoc responses to the climate issue and subsidize expensive solutions.

I want to emphasize the importance of including four key provisions in the Committee's bill: (1) an allocation formula that protects electricity customers; (2) cost containment that protects the overall economy and jobs; (3) more reasonable near- and mid-term targets and timetables for curbing GHG emissions; and (4) support for the widespread deployment of commercial nuclear power.

Consumer Protection for Electric Customers

First, climate legislation must contain an effective consumer protection measure for our industry's customers. We firmly believe that we can accomplish our national environmental objectives while ensuring robust economic growth. We support a mechanism that will allocate, rather than auction, the emissions allowances for the power sector to benefit our customers. Allocating 40% of the total allowances to local distribution companies – known as LDCs – for a transitional period is critical to help limit increases in electricity prices for our customers without sacrificing the desired environmental objectives. We at Exelon have done pioneering work on this subject having first proposed it almost four years ago. The program would be overseen by state utility regulators who will ensure that the benefits of those allowances go to customers rather than corporations.

To be abundantly clear, neither Exelon nor its shareholders will profit from allowances that go to the LDCs. The formula for distributing those allowances is very important to ensure that no single region of the country is disproportionately hurt or benefited. EEI has endorsed the formula in the Kerry-Boxer bill, and the Chairman's mark, that would distribute half of the allowances based on an LDC's historic emissions and half of the allowances based on an LDC's sales. We do not support distributing all of the allowances based on emissions as some would urge you to do; nor does EEI. Doing so would mean that virtually all of the benefits of the allowances would go to states whose generation is principally coal based and would not be fair to customers of utilities who have already made substantial investments in low carbon emitting generation fleets. This distribution formula was a key component in garnering our industry's support for the House-passed allocation provision.

We are pleased that the Kerry-Boxer bill and the Chairman's mark provide 30% of allowances to LDCs for the benefit of their customers and uses the EEI formula to distribute those allowances. I do want to note, however, that the actual number of allowances to LDCs under the Chairman's mark would be nearly 18% less in 2020 than under the House-passed bill because so many allowances are taken "off the top" of the total pool for things like deficit reduction and numerous other programs. We join EEI in supporting increasing the electric sector's share to 40% of the total pie, which is comparable to our sector's share of emissions.

Cost Containment

Second, climate legislation must include an effective cost containment mechanism that will limit societal costs in the early years of the program. While it is very important to begin putting a "price" on carbon, it is also important to cushion the impact on our economy and customers for a reasonable transition period. EEI, USCAP and NCEP have emphasized the importance of cost containment provisions. We endorse a so-called "price collar" mechanism that establishes a floor and ceiling on emissions allowance prices. This consumer protection measure will help reduce the economic impact on electricity consumers, U.S. workers, and the economy while discouraging market manipulation and limiting price volatility. The Kerry-Boxer bill would establish a government reserve of GHG credits, including both allowances and offset credits, and both a floor and a ceiling on the price of both. Allowances and offsets sold from the reserve must be accounted for over time under the overall cap on GHGs. The reserve must be large enough to ensure price stability in allowance prices, particularly in the early years of the program.

Targets and Timetables

We believe that the targets and timetables for greenhouse gas reductions in the Kerry-Boxer draft, which are also in the Chairman's mark, are overly aggressive. We are particularly concerned about the goals established for the earliest years before new greenhouse gas reduction technologies have been developed and commercially deployed. For example, we do not expect substantial deployment of either new nuclear generating stations or new coal generating stations with carbon capture and sequestration in a timeframe that will achieve the results mandated by the draft. Consequently we believe that a goal of reducing emissions 14% below 2005 levels by 2020 is much more appropriate and achievable than the 20% goal included in the Kerry-Boxer bill. We look forward to further discussions with the members of the Committee on this subject.

Nuclear Power

Exelon is proud to be the nation's largest owner of commercial nuclear power generating stations; we own 17 nuclear reactors at 10 generating stations located in Illinois, Pennsylvania, and New Jersey. Nuclear energy is the nation's largest emissions-free source of power, providing nearly 20% of our country's electricity. New nuclear plants will both help us meet our future energy needs and also serve as an important source of green jobs. Studies conducted for the Nuclear Energy Institute indicate that construction of a new nuclear power plant provides up to 2,400 jobs during construction and will provide approximately 700 permanent jobs for several generations of workers over the 60 year operating life of the plant. And these are good jobs, paying 36 percent more than average salaries in the local area. Compared to other generation sources, nuclear power is an enormous jobs producer. For every 1,000 megawatts of capacity, nuclear power provides 550 operations jobs. This compares to 220 jobs in a 1,000 megawatt coal plant, 90 jobs for a comparably size wind farm, and 60 jobs for natural gas.

We were very pleased to see the nuclear provisions included in the Kerry-Boxer bill, including the laudatory language about the role nuclear power plays in avoiding GHG emissions and the recognition that the long lead times for nuclear power plant construction require that action to move forward with new nuclear development not be delayed. We were also gratified to see the "statement of policy" section that calls for facilitating the continued development and growth of a safe and clean nuclear energy industry, through: (1) reductions in financial and technical barriers to construction and operation; and (2) incentives for the development of a well-trained workforce and the growth of safe domestic nuclear and nuclear-related industries.

We also applaud the provisions on nuclear workforce training, nuclear safety and waste management, as well as research and development provisions on extending plant life beyond 60 years, advanced fuel designs to enhance safety, and proliferation-resistant recycling technologies.

However, from a substantive standpoint, we are concerned that the bill does little to actually facilitate the large-scale deployment of new plants that will be necessary to reduce emissions on a broad scale. Modeling by the Environmental Protection Agency and the Energy Information Administration estimates that we will need well over 100 new nuclear plants to meet our climate goals. Those analyses also indicate that we can achieve our environmental goals faster, and more cheaply, with the widespread deployment of new plants in the near term. Simply put, we need to do more. This need was recognized in a very important op-ed by Senators Kerry and Graham, entitled "Yes We Can (Pass Climate Legislation)," published in the *New York Times* on October 10. We support their joint effort to develop a more comprehensive proposal in support of nuclear power to be included in the Senate's climate bill.

I want to highlight three proposals we believe should be included in a nuclear power title. I do recognize that this Committee and the Energy and Natural Resources Committee have jurisdiction over various aspects of the nuclear industry. Our suggestions fall within both Committees' jurisdiction.

Nuclear Uprates and the Renewable Electricity Standard (RES)

We believe that nuclear uprates – that is, projects that increase the electrical output from existing nuclear generating stations – provide the quickest way to get additional emissions-free nuclear generation on line. Roughly 8,000 megawatts of new, clean nuclear energy are achievable in this way.

Unfortunately, continued low natural gas prices and high capital costs would make the largest of these potential uprate projects economically unattractive. However, these projects would remain economically viable even in a very low price markets if nuclear uprates were treated as a "qualifying resource" under the proposed RES. Treating uprates as a qualifying resource would put nuclear on a par with "incremental hydro" (hydro uprates) in the legislation. Doing so would allow a utility to meet part of its renewable obligation by purchasing electricity generated from nuclear uprates. The Energy and Natural Resources Committee has reported a bill that includes an RES, so this provision should be added as part of a manager's amendment or on the Senate floor. In the event that there is a tax title, we also believe that uprates should be entitled to an Investment Tax Credit like other clean energy technologies.

Waste Confidence

The second issue, which affects both existing and new plants, is waste confidence. The Nuclear Regulatory Commission (NRC) regulations require the Commission determine that it has reasonable assurance that spent nuclear fuel will be safely and securely managed and disposed of before it can issue a new license, or extend an existing listing, for a nuclear plant. The NRC has long relied upon the eventual construction of the Yucca Mountain repository to support that determination. It is now apparent that the NRC can no longer rely on that program as the basis for its determination that a repository will be operational by 2025.

Even without Yucca Mountain, however, there is a consensus in our industry, and in the nuclear regulatory community, that on-site storage of used fuel is a safe long-term alternative while we explore other permanent storage options. Congress should legislatively declare that the existing on-site storage technologies for used fuel provide sufficient confidence that used fuel will be safely stored at both existing and new nuclear generating stations while we search for a new permanent storage option. A legislative solution will avoid years and years of protracted litigation on this subject.

I personally believe that reprocessing of used nuclear fuel will ultimately prove to be a viable option, but I do not believe all of the issues pertaining to reprocessing have been adequately explored. Clearly there is broad, bipartisan support in the Senate for continued research and development on the reprocessing issue.

Loan Guarantees

As I have indicated, any successful, long-term GHG reduction program must include additional development and deployment of new nuclear power generating stations and coal-fired power plants with carbon capture and sequestration. I will focus on nuclear plants because that is where I have the most expertise. Deployment of new nuclear plants simply will not happen, given the large up-front capital costs, without a much more robust federal loan guarantee program than currently exists.

The Energy Policy Act of 2005 included a loan guarantee program for our sector. While that program has great potential, its authorization ceiling – known as the "loan guarantee volume" – simply is inadequate to provide the support necessary for a substantial expansion of commercial nuclear power. In passing the stimulus package earlier this year, the Senate supported increasing the loan guarantee volume for new nuclear plants by an additional $50 billion. Unfortunately that increase was dropped during conference with the House. We urge you to renew your support for an authorization at that level.

The Energy and Natural Resources Committee has endorsed a Clean Energy Deployment Administration that would expand the amount of loan guarantees available and provide additional independence for the program within the Department of Energy. There are also a host of technical changes to the loan guarantee program that should be included. We endorse these efforts as essential to a successful program.

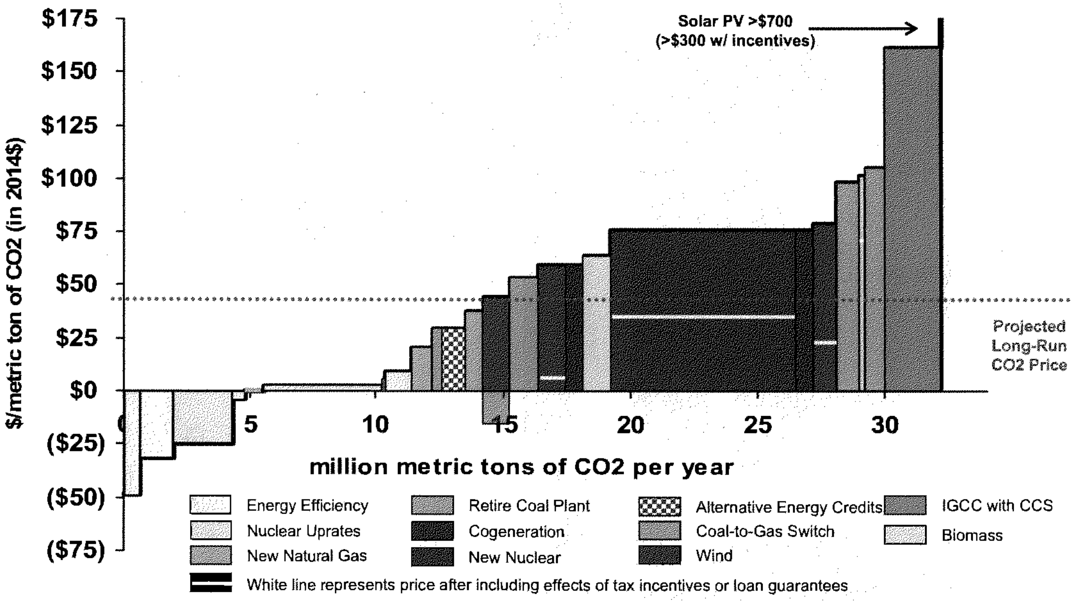
NEI has also identified a list of additional initiatives to be included in a comprehensive bill, and I commend them to you. They can be found at: http://www.nei.org/newsandevents/newsreleases/nei-unveils-package-of-policy-initiatives-needed-to-achieve-climate-change-goals/. Several of these are tax credits which, of course, are under the jurisdiction of the Senate Finance Committee.

Conclusion

In conclusion Madame Chairman, thank you for the opportunity to testify on this important issue. As you have already heard during the course of these lengthy hearings, there is a broad coalition of businesses, labor, environmentalists, academics, and other stakeholders who support passage of climate change legislation as soon as possible. As evidence of that support, I am attaching a statement, which we endorsed, that appeared recently in several national publications calling on the Senate to pass clean energy legislation with a cap on greenhouse gas emissions this year. The statement was signed by 32 parties.

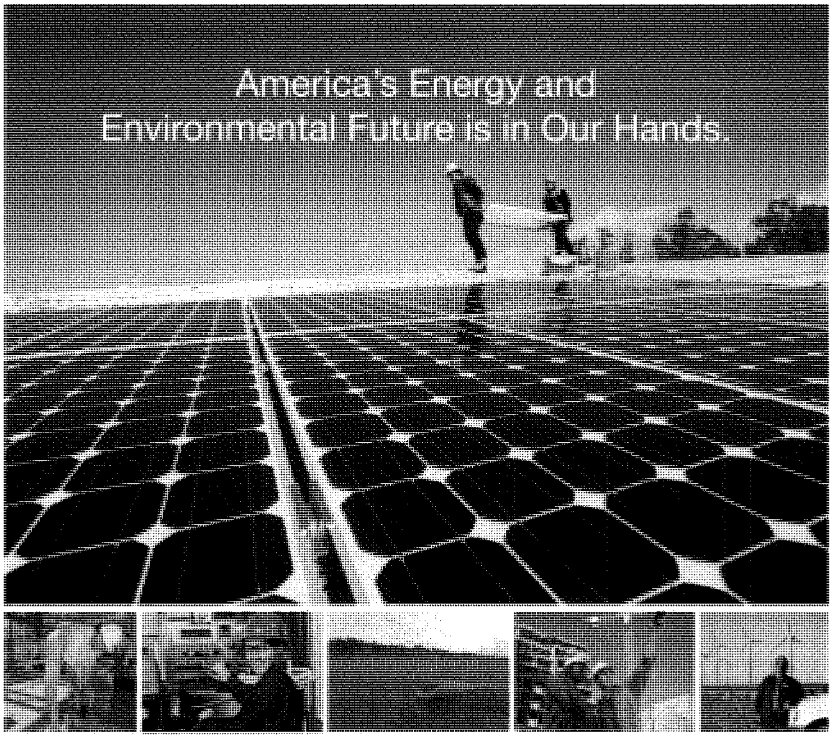
I simply cannot overstate the critical need for this Committee to approve a comprehensive bill that will put us on the path to a low-carbon future. That path is long and challenging. We need an approach that is both bold and reasonable and provides some degree of economic certainty for us to plan for our future. I realize that you are encountering committed and powerful opposition; taking meaningful action on this very difficult challenge will require political courage and an ability to take the long view. Climate change truly is one of the greatest challenges facing our nation and the world in this new century and nothing is more important for our nation's economic, energy and environmental future than dealing with it. Now is the time to get on with it.

Cost of Carbon Mitigation in Electricity Supply



Note: Emissions abatement estimates for new generation capacity represents emissions reduced in the market as a result of the project less emissions introduced due to the project (if any). New nuclear plants assumes 1,460 MW of new generation.

Cap-and-trade legislation will encourage us to do the cheapest options first



Right now, Congress is working to develop legislation to save energy, improve our energy security, and address climate change in the most cost-effective way. This can help create an estimated 1.7 MILLION JOBS across the United States – CLEAN ENERGY JOBS IN EVERY STATE IN OUR COUNTRY.

Legislation is needed to secure our country's energy supply while capping and reducing greenhouse gas emissions through a robust, market-based approach. Climate change is real and the longer we delay taking prudent action, the higher the cost for future generations. Legislation is our best opportunity to get a low cost, effective national response this year.

It's an American solution to a global economic and environmental challenge. That's why leading business, labor, and environmental advocates have joined together to support critical national legislation. Working together, we can do it, and create more jobs while we do so.

We call on the Senate to pass clean energy legislation with a cap on greenhouse gas emissions this year.

ALCOA
AUSTIN ENERGY
BLUEGREEN ALLIANCE
Boston Scientific
climate protection action fund
Constellation Energy
Deutsche Bank
DOW
Duke Energy
E2 ENVIRONMENTAL ENTREPRENEURS
EDF
Entergy
Exelon.
Holcim
Interface
Johnson Controls
Johnson & Johnson
nationalgrid
The Nature Conservancy
NRDC
NRG
PEW CENTER Global
PG&E Corporation
PNM Resources
PSEG
RioTinto
SEIU Stronger Together
United Technologies
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JOHN W. ROWE
CHAIRMAN AND CHIEF EXECUTIVE OFFICER
EXELON CORPORATION
RESPONSES TO QUESTIONS FOR THE HEARING RECORD
OCTOBER 30, 2009

QUESTION FROM SENATOR BERNARD SANDERS

1. **Do you support including a cost-effective, flexible energy efficiency investment requirement for the electric utility allocation, similar to what was required for the natural gas allocation?**

   We believe energy efficiency will play a very important role in any solution to the climate change issue. Our Exelon 2020 analysis, referenced in my testimony, shows that energy efficiency is by far the most cost-effective way to abate carbon emissions. Because of this, under a market based cap and trade system we expect emitters will gravitate to the lowest-cost option with or without an efficiency set-aside.

   The Kerry-Boxer bill already contains an allowance allocation specifically to support state and local investment in energy efficiency programs (Division B, section 202), so an additional set-aside is unnecessary and potentially duplicative.

   In addition, the bill would allocate allowances to the electric power sector (Section 771). Allowances would be allocated to: (1) local distribution companies (LDCs); (2) merchant coal generators; (3) long-term contract generators; (4) small LDCs; and (5) qualifying cogeneration facilities. The bill specifies that allowances allocated to LDCs must be used "exclusively for the benefit of retail ratepayers of such electricity LDCs…" In order for an LDC to receive an allowance allocation, the bill requires that the entity with authority over the company's retail rates complete a rate proceeding or equivalent process to establish a plan for the implementation of the section. In the case of investor owned utilities that means the state public utility commission would have comprehensive oversight over the use of allowance proceeds by LDCs. LDCs must report on the use of the allowances they receive.

   Thus, state public utility commissions would have the flexibility to approve LDC programs to use allowances to support energy efficiency programs, provided they determine this benefits consumers, just as they can choose to emphasize other policy goals, such as low- and moderate-income assistance or renewables.

We at Exelon believe that state public utility commissions are well suited to make the policy decision as to what programs in their state would be most beneficial to retail electric customers in their respective states, consistent with policies and priorities in their states. Congress should not supplant the role of the state public utility commissions by specifying how to allocate the allowances to specific programs.

Ensuring that allowance value flows to electricity consumers is one of the most critical issues in climate legislation for the electric utility industry. Cost containment measures — such as allocations to LDCs — are critical to both protect consumers and ensure broad, long-term public support for climate legislation. Proposals such as a federal set-aside of allowances dedicated to energy efficiency would divert the value of allowances away from immediate rate relief for consumers and would jeopardize that support.

Moreover, any climate legislation approved by the Environment and Public Works Committee is expected to be combined for consideration on the Senate Floor with an energy bill already reported by the Energy and Natural Resources Committee (S. 1462), which contains a renewable energy/energy efficiency requirement that will provide a strong incentive for utilities throughout the country to greatly increase their investment in energy efficiency programs.

JOHN W. ROWE
CHAIRMAN AND CHIEF EXECUTIVE OFFICER
EXELON CORPORATION
RESPONSES TO QUESTIONS FOR THE HEARING RECORD
OCTOBER 30, 2009

QUESTIONS FROM SENATOR DAVID VITTER

1. **Exelon had a public disagreement with the U.S. Chamber of Commerce, correct?**

   On Monday, September 28, 2009,Exelon informed the U.S. Chamber of Commerce that we would not be renewing our membership. Exelon's decision was widely reported in the media.

1. **The US Chamber of Commerce has a different view than Exelon on the pending bill, correct?**

   Yes.

2. **And President Obama and his advisors have had public disagreements with the U.S. Chamber of Commerce, right?**

   According to media reports, President Obama and his advisors have had public disagreements with the U.S. Chamber of Commerce.

3. **And your corporation has given substantial donations to President Obama, correct?**

   No. Exelon Corporation is prohibited by law from supporting candidates for Federal office.

4. **David Axelrod, President Obama's senior advisor, has served as a consultant to Exelon's subsidiary ComEd, right? On what issues?**

   We have worked with ASK, the firm that David Axelrod was formerly affiliated with, periodically since 2002. The work involving Axelrod was primarily for our Chicago-based utility company, Commonwealth Edison ("ComEd"). ASK provided advice on public communications strategy, primarily for ComEd as it transitioned out of a 10-year rate freeze.

5. **Have you had any conversations with U.S. Chamber members in which you have discussed resignation from the Chamber?**

After deciding not to renew our membership with the U.S. Chamber, we have discussed our decision with a number of Chamber staff and members to explain our decision.

6. **Is it your testimony that you have had no conversations with U.S. Chamber members in which you have discussed Exelon's resignation from the Chamber, or the resignation of any other company from the Chamber?**

   Neither I, nor members of my staff, had any conversation with U.S. Chamber staff or members prior to making our decision to resign from the U.S. Chamber. After deciding not to renew our membership with the U.S. Chamber, we have discussed our decision with a number of Chamber staff and members to explain our decision.

7. **Have you had any interaction-letters, phone calls, meetings, discussions-with environmental groups (such as NRDC, Sierra Club, or Environmental Defense) or political activist groups (such as MoveOn.org), regarding resignation of membership from the U.S. Chamber of Commerce?**

   After deciding not to renew our membership with the Chamber, we have discussed our decision with a number of organizations to explain our decision. We did not discuss our decision not to renew our Chamber membership with these organizations prior to making and announcing our decision.

8. **You have been a vocal supporter of cap-and-trade legislation, right? Why?**

   I have supported carbon regulation since 1992, when I testified before the House Energy and Power Subcommittee on the issue. I believe that the science is compelling that our planet is warming and that man-made emissions of greenhouse gases are partially responsible for that warming. We need a cost-effective, efficient, market-based response to the climate challenge. I support a cap and trade system because I believe it incents companies such as ours to find the lowest cost solutions to the climate problem.

9. **Your company has significant nuclear power interests and the capability to build new generating facilities, correct? And this legislation will provide a substantial financial boost to Exelon nuclear power business, correct?**

   Exelon is the nation's largest owner and operator of nuclear power plants. We own and operate 17 nuclear generating stations at 10 sites in Illinois, Pennsylvania, and New Jersey. We currently have no plans to build new nuclear plants, though we have secured an Early Site Permit for our Clinton site in Illinois and are planning to submit an Early Site Permit next year for a site in Victoria County, Texas. We believe that Exelon Generation will see increased earnings of roughly $750 million a year for every $10 a ton in carbon fees, subject to the market and legal conditions.

10. **In fact, Exelon's 10 nuclear facilities represent about 20% of the nation's nuclear energy and would be benefitted by the legislation by encouraging the use of nuclear power, right?**

Exelon's nuclear facilities represent slightly less than 20 percent of the nation's nuclear generation. We believe that Exelon Generation will see increased earnings of roughly $750 million a year for every $10 a ton in carbon fees.

11. **In fact, your company is the largest nuclear generator in the country, correct? Do you recognize that you have a bias in this debate as the CEO of the nation's largest nuclear generator? You admitted to this bias during a speech at the Brookings Institute in February 2008, correct?**

Exelon is the nation's largest owner and operator of nuclear power plants. Like all stakeholders in this debate, I have a view on public policy issues that is informed by my experience and my position. I do not consider it a bias. As I noted in my testimony, however, I have supported carbon regulation since 1992, when I testified before the House Energy and Power Subcommittee on the issue. At that time, I served as the Chairman of New England Electric Systems (now National Grid), which at the time used coal as its primary source of power generation.

12. **Has Exelon projected how much money its nuclear power business will make if this legislation is passed?**

We believe that Exelon Generation will see increased earnings of roughly $750 million a year for every $10 a ton in carbon fees.

13. **You stated publically at the PennFuture Southeast Global Warming Conference just a few weeks ago (October 12, 2009) that electricity prices will go up if this bill is passed, correct? And this would lead to increased cash revenue for Exelon, correct?**

Yes. Emissions free generation sources, including our nuclear and renewable generation, will benefit from any increased cost in fossil generation.

14. **In fact, securities filings from Exelon also indicate that it could see a cash flow increase by more than $1 billion a year if the bill passes, correct?**

    We believe that Exelon Generation will see increased earnings of roughly $750 million a year for every $10 a ton in carbon fees. If carbon prices are $15, our earnings would increase by more than $1 billion, subject to market and other legal conditions.

15. **The bill would also likely create a marketplace in Chicago for tens of billions of dollars' worth of carbon emission allowances that Exelon could capitalize on, correct?**

    No.

16. **All this money Exelon stands to make from passage of this bill-do you plan to return all the money to customers? If so, how?**

    As we look toward the future, our planned investment profile calls for investing more in low carbon generating resources than we will have in increased earnings from any carbon control regime.

    As a low-carbon generator, Exelon will benefit financially from carbon legislation. But, this is due to planning and investment, not luck. I first testified to Congress about climate change in 1992. About 9 years ago, shortly after I came to Exelon, the company made a strategic decision to sell most of our coal-powered plants and continue investing heavily in nuclear plants, which emit virtually no carbon. We did this in part because we wanted to be well positioned for a low-carbon future.

    Since Exelon was created in 2000, we have invested nearly $5 billion in capital in our nuclear plants. Over the period 2010-2017, we plan to invest an additional $10 billion in those existing plants, ensuring their continued reliability and – even more importantly – enabling them to increase their output. This represents an investment in the fleet of $15 billion from 2000-2017.

    Our $15 billion investment:

    - Has supported sustained high levels of generation and safety performance;
    - Has provided about 140 million megawatt hours (MWhr) of clean carbon-free energy per year;
    - Has increased the output of the existing plants by 12% since 2000 through investment in equipment reliability, power uprates and plant efficiency improvements;

- Will provide an additional 10-12 million MWhr annually through power uprates by 2017 – the equivalent of a large new nuclear plant; and
- Will ensure extended life for our nuclear plants through continued reliability and license renewal

17. Will you commit TODAY not to raise electric rates for your customers if this bill becomes law?

I cannot, nor could anyone, commit not to raise electric rates for our customers if this bill becomes law. Our rates are set by competitive wholesale markets, where our utilities costs of procuring electricity depend upon market conditions over which we have no control. Neither Exelon nor its local distribution company affiliates controls electricity rates. Unlike Louisiana, the states of Illinois and Pennsylvania have required electric generation to be separate and apart from local distribution companies that deliver and sell electricity at the retail level. In fact, Exelon Generation is prohibited by state laws from entering into new bilateral contracts with ComEd or PECO Energy (PECO). ComEd and PECO obtain their electricity through state-supervised auctions in which a number of generators participate.

18. Are you aware that some have accused you of looking for a handout from the federal government?

No.

19. Exelon has expressed an interest in playing a major role in the development of the smart grid, correct?

Exelon, like all utilities, has expressed an interest in smart grid development. Our two utility subsidiaries, ComEd and PECO, filed for smart grid grants with the Department of Energy. PECO was informed this week that it will receive a $200 million grant; ComEd's proposal was not approved.

20. What other correspondence have you had with the White House regarding the Smart Grid Grant Program? The Department of Energy?

We have had no correspondence with the White House regarding the smart grid grant program. ComEd and PECO both participated in a formal grant solicitation process run by the Department of Energy.

21. Ultimately, the DOE increased the maximum award on grants from $20 million to $200 million. Exelon stands to benefit from this increase, right? Did you have any role in lobbying for this increase?

No, neither Exelon, nor its utilities, benefits financially from smart grid grant awards. Energy efficiency and demand response programs, including those facilitated by a smart grid, generally reduce revenues for utilities. Funds that would be received by utilities to develop smart grid technologies cannot be included in a utility's rate base. This means that the utilities do not get a rate of return for investments made with these funds. Further, the deployment of these technologies is expected to help customers to reduce their bills and lower their consumption which will ultimately result in a loss of revenue for our utilities. That said, utility customers stand to benefit from smart grid investments for the above mentioned reasons.

Exelon did not lobby the Department of Energy to increase the size of the award. The Obama Administration's policy with respect to ARRA grant awards specifically precludes lobbying.

22. **Has Exelon conducted studies of profit potential flowing from its involvement in the smart grid, correct? Who prepared them? What were the findings?**

No.

23. **Has Exelon applied for a smart grid grant under the DOE's program? How much? For what projects?**

No, Exelon has not applied for smart grid grants. ComEd and PECO, subsidiaries of Exelon, both applied for Smart Grid Investment Grant ("SGIG") program funds. They sought $175 million and $200 million awards respectively to support their smart grid development efforts. PECO was informed this week that it will receive a $200 million grant; ComEd's proposal was not approved.

24. **You stated recently in Exelon's recent quarterly call that your utilities unveiled Smart Grid plans totaling $1 billion of potential investments and have filed applications for federal stimulus dollars for up to $375 million, right?**

Yes.

25. **One of Exelon (sic) companies, Commonwealth Edison recently sought $175 million from the DOE, correct? What for? If granted, this would be of financial benefit to CornEd, right?**

(Note: We are not aware of any entity known as CornEd; we will assume that this question, and later questions, are intended to refer to ComEd, Exelon's utility subsidiary.) As indicated above, our utility subsidiary ComEd applied for a $175 million SGIG grant.

However, neither Exelon, nor its subsidiary ComEd, stands to benefit financially from the award of this grant. As noted above, energy efficiency and demand response programs, including those facilitated by a smart grid, generally reduce revenues for utilities. Funds that would be received by ComEd to develop smart grid technologies cannot be included in its rate base. This means that ComEd would not get a rate of return for investments made with these funds. Further, the deployment of these technologies is expected to help customers to reduce their bills and lower their consumption which will ultimately result in a loss of revenue for ComEd. That said, ComEd's customers stand to benefit from smart grid investments for the above mentioned reasons.

26. And the Department of Labor recently announced that CornEd may receive $5 million for the solar pilot program under the Investment Program, right? And you are in negotiations with the Department of Energy and the Obama Administration for this program, right?

ComEd has not been informed that it will receive any funds from the Department of Labor. ComEd has been informed that it has been awarded $5 million by the Department of Energy for a study of the impact of photovoltaic distributed generation and customer response to pricing signals within a Smart Grid and it is in the process of finalizing the details of this award with that Department.

27. Recently, CornEd announced that it was partnering with Silver Spring Networks and GE Energy on its smart grid project, right? They are also partners with Google, who stands to also profit handsomely from this legislation?

ComEd is partnering with Silver Spring Networks and GE Energy on its smart grid efforts. Media reports indicate that Google has invested in Silver Spring Networks. We are not aware of any other relationships that may exist between these parties, nor are we privy to knowledge of the impact of legislative proposals on their respective businesses.

28. Another of Exelon's companies, PECO, recently filed an application for $200 million with the Department of Energy, correct? And this effort is part of Exelon's goal to benefit financially from the proposed legislation? You expect to receive this money?

Yes, PECO applied for and has been awarded a $200 million SGIG award from the Department of Energy. PECO did so with the active support of the Pennsylvania Public Utility Commission which urged it to seek out

ARRA funds where they might be used to reduce customer bills and usage. No, PECO's application is not related to the proposed legislation.

29. Did you agree to support the current legislation in exchange for receiving grant money from the Obama Administration?

No. Exelon has been a long-time supporter of climate legislation. That support predates the current Administration.

Senator BOXER. Thank you so much, Mr. Rowe.

I am going to ask Senator Carper to introduce our next witness.

Senator CARPER. Thank you.

I am going to ask Senator Udall maybe to join me in this introduction because he has known Dr. Kempton for even longer than I have, and he has some great stories I am sure he could tell, but maybe he won't. But I am just delighted that Dr. Kempton can be here today.

He is a Professor in the University of Delaware, used to be the College of Marine Studies. It is marine policy at our university. And he was really among the very, maybe the first person that I ever talked to at the College of Marine Studies who shared with me the potential for generating an enormous amount of electricity off of the coast of our country in ways that will provide economic opportunity, creating jobs for the deployment, preparation and the manufacturing of the equipment, and the deployment of that equipment, to maintain that equipment, but also producing electricity in a very cost effective way that creates no carbon dioxide, no sulfur dioxide, no nitrogen oxide, no mercury, and is compatible with the environment.

So we are grateful for the great work that you have done and the enthusiasm and encouragement you have provided for me and for others.

Let me just yield briefly to Tom Udall for a word or two about his childhood friend, Dr. Willett Kempton.

Senator UDALL. Well, I am not, Senator, I am not going to tell——

Senator CARPER. I have asked him to give the PG version, the PG version.

Senator UDALL. The main thing I want to say is that Professor Kempton got here on his own merit. It had nothing to do with me, and I think you have learned, and I think the panel will end up learning, that he has much to say as to how we move forward on alternative forms of energy, which is a great resource off your coast and the whole Northeast coast.

So thank you for the opportunity, but I will certainly ask him some questions and draw out his great expertise that he has in this area.

Thank you.

Senator CARPER. And Madam Chair, if I could just add in conclusion that several years from now, when people come to Rehoboth Beach, Delaware, and they look out to the east, they will see something sticking up above the horizon about half the size of my thumbnail, and it will be a windmill farm generating enough electricity for about 100,000 homes, and we hope to be joined in that effort by States from like Maryland and New Jersey as well.

Thank you.

Senator BOXER. Thank you.

So with that fantastic introduction, Dr. Kempton, I hope you are not too nervous now, but please proceed.

STATEMENT OF WILLETT KEMPTON, PROFESSOR, MARINE POLICY, UNIVERSITY OF DELAWARE

Mr. KEMPTON. It is hard to follow that introduction, but I very much appreciate it.

So, Madam Chairman and members of the committee, I very much appreciate the opportunity to testify today.

Senate bill 1733 aims to create incentives to lead the development of new technologies for power with less or no release of CO_2. Other witnesses will speak to nuclear, carbon capture and storage and so forth. I will concentrate on new technologies that are carbon-free, very large, and near cost competitive today.

These provide an important regional balance on power and offer substantial economic development employment opportunities, as Senator Carper mentioned. As we know, the Great Plains have abundant wind resources. The Southwest has concentrating solar, both large and near cost effective. What is available for the U.S. coastal regions, which many members of this panel represent, of course?

My written testimony, which has been submitted, cites Federal energy studies comparing offshore resources adjacent to the East Coast, Great Lakes, Gulf and Pacific Coasts. Those studies show that offshore wind is a very large resource. It is actually larger than other ocean renewable power that you hear about, waves and so forth. It is also over twice the power resource of all U.S. offshore oil. It is a very large resource.

Now, our group has made a more detailed estimate of the total offshore wind resource adjacent to the mid-Atlantic coastal States from North Carolina through Massachusetts. That is attached as a submitted supporting testimony.

The conclusion of this is that the practical, as we looked at real technologies that exist, water depths, bird flyways, and so forth, the practical offshore wind resource of the mid-Atlantic is enough to power all electricity of that region, all gasoline for automobiles, and all building heating fuels for the region. Those together use just half the resource.

And if we were to do that, this is a paper and pencil study. I am not saying that we would build all that out and not use other sources, but if we were to do that, that would reduce the region's CO_2 emissions by 68 percent.

I calculate also the industrialization employment impacts of producing enough gigawatts to do this at 100 percent of electricity plus 100 percent of vehicles electrified in the mid-Atlantic, so it would require 54,000 offshore wind turbines, each with a capacity of five megawatts, average production of two megawatts.

To do this within 15 years, a challenging target, requires 10 factory complexes, each employing perhaps 500 people, plus suppliers, support jobs and so forth. This calculation, spelled out in my written testimony, shows that very substantial reductions in CO_2 are possible in short timeframes like 15 years by redeploying some of our existing and rusting industrial infrastructure.

This concrete calculation for one U.S. region supposedly lacking in renewable resources also suggests that carbon reductions of S. 1733 are achievable.

I briefly review how a regional cap and trade regime, the regional greenhouse gas initiative, like the one before this committee, has helped to lead to the first U.S. power contract for offshore wind. In Delaware, we face a choice among power plants, and three commercial bids were submitted, natural gas, offshore wind, and IGCC coal. Costs were compared by the State Commission over the lifetime of each generator, which means they could take the carbon costs estimated under RGGI and incorporate that into the calculation of total cost, as I believe companies will be able to do with this bill, especially if there is a collar.

Ultimately, the offshore wind bid was selected by the Delaware Public Service Commission. It was more price stable than natural gas, although not necessarily lower cost, and it was less expensive on a per megawatt hour basis than IGCC coal.

As a result, the State has a head start on new technology, as well as immediately creating 500 jobs during construction, 70 O&M jobs persisting over the 25 years of operation.

There are a couple of examples I draw from that. One is even modest fees, because the RGGI fees are quite a bit smaller, even modest fees as a result of a cap and trade system can tip the balance when you have near cost competitive new technologies, in addition to other policies that were in place, of course.

And also, the RGGI carbon fees, estimated at a level of about $10 a ton over the life of the project, were too small to make carbon sequestration cost effective, but it was enough to motivate a plant which could have that added later.

Senator BOXER. Please wrap up now.

Mr. KEMPTON. I have a summary.

Each region in the U.S. has at least one source of carbon-free power that is larger than that region's needs. It is being produced commercially at utility scale and is near cost competitive. A new one is wind along the East Coast. As I said, it is sufficient to run the East Coast.

Based on regional experience, a carbon pricing system like S. 1773, in combination with other policies, can tip the economic balance toward new technologies which are important for the Nation's economic growth.

Thank you.

[The prepared statement of Mr. Kempton follows:]

Large-Scale Carbon-free Power for the East

Written Testimony, Thursday, 29 October 2009, before the
U.S. Senate Committee on Environment and Public Works
Legislative Hearing on S. 1733, Clean Energy Jobs and American Power Act

Testimony of
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Large-scale carbon-free power throughout the US

S. 1733 aims to create incentives that will lead to the development of new technologies for energy and power with less release of CO2 into the atmosphere. Existing central-station technologies such as nuclear and potentially coal with carbon capture could provide low-carbon power. Here I concentrate on new technologies that are carbon-free, that is, renewable power resources. I will show that carbon-free sources provide an important regional balance and that they offer substantial economic development and employment opportunities.

Many of the largest carbon-free power sources are regionally concentrated, as briefly reviewed in this paragraph. In the Great Plains, our country has tremendous wind resources, more than that region's energy needs. In the Southwest, strong direct sunlight enables concentrating solar, again with a resource greater than the local need, plus the possibility of inherent storage at relatively little incremental cost. Geothermal provides fairly constant power, now practical primarily in the far West. These three are all close to economically competitive so that several years of cost assistance like that in S. 1733 (section 202) are likely to bring them to market competitiveness. Solar photovoltaic, that is solar-electric cells, can be tapped most anywhere and their modularity makes them ideal for distributed building use, but they are further from competitive for wholesale power.

None of the foregoing large-scale, near-competitive sources are on the US East Coast, a region that represents roughly half of national electricity consumption. Representatives from this region have said that they do not want to continue to import most of their energy, even if it is clean electricity from the Great Plains (Bowles 2009). Also, we need new resources in all regions of the nation in order to preserve the geographic diversity that is critical to maintaining a robust, secure power grid.

Table 1 draws on a recent NREL/DOE report with approximate estimates for the entire US.[1] The estimate of the US offshore wind resource is 450 GW_a. (GW_a is the average power output of the resource over the course of a year; it allows easy comparison among capacity, variable resources like wind and solar and dispatchable sources like gasoline.) Since US national electric retail sales are 419 GW_a, there is enough offshore wind power to produce electricity for the entire country.

Table 1. US coastal energy sources (sources: DOE; EIA; MMS).

	TWh/yr	GW_a
US consumption		
Electricity retail sales[2]	3,670	419
Gasoline (delivered power)[3]	987	112
Offshore Renewable power		
Offshore Wind[4]	3,948	450
Wave Energy	252	29
Tidal Current	17	2
Ocean Current (Florida)	50	6
In-stream River Current	110	13
Thermal gradient (OTEC)	Very large	
Offshore oil and gas, extracted over 20 years		
Offshore oil (64 BBO)[5]	1,627	186
Offshore gas (270 Tcf)[6]	1,620	185

Offshore wind is the United States' largest ocean energy resource, even in comparison to offshore oil and gas resources. Even based on an assumption in

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[1] From Musial 2008, table 3 (in turn based on EPRI and earlier studies). I have added US electricity and gasoline consumption (top lines) and OCS oil and gas (bottom lines) for comparison, and I convert TWh/yr to GWa.

[2] US EIA, Table 5.1. "Retail Sales of Electricity to Ultimate Customers" Electric Power Monthly with data for February 2009, Report Released: May 15, 2009. This figure is 2007 retail sales.

[3] US Energy Information Agency, Table "U.S. Product Supplied of Finished Motor Gasoline (Thousand Barrels)" 2008 year, Release Date: 6/29/2009 (on line as Petroleum Navigator, accessed Oct 2009). 3,290x10^6 BBL x 42 gal/BBL * 9.44 kWh/l = 4938 x 10^9 kWh * 20% efficient cars = 987 TWh/year delivered to wheels.

[4] The report split wind into 3270 TWh/yr deep water >30m, plus 678 TWh/yr shallow water.

[5] 64 BBO, from Mean Undiscovered Economically Recoverable Resources of the OCS, at $110/BBL, from Table 2, OCS Report MMS 2009-015. To compare with electricity in this table, 64 BBO oil energy is equivalenced to its energy content (1 BBL = 1,695 TWh), then to electric power at 30% conversion, and assuming a 20 year burn. If gasoline versus electric automobiles are compared, the conversion multiplier for oil should be 20% rather than 30%.

[6] 270 Tcf @ $11.79/Mcf (MMS 2009-15, Table II-3). Energy content 81x10112 kWh * 40% efficiency for gas to electricity / 20 years = 1620 TWh/year.

Table 1 that we drill very fast and pump oil out at a rate that would exhaust the supplies in 20 years, offshore oil is less than ½ the size of the offshore wind resource. Of course, when we are done pumping, the oil is gone along with the associated jobs.

The national analysis in Table 1 motivates a more careful regional examination of offshore wind. Could this be a large, carbon-free resource for the East Coast? And is it close enough to being economically competitive that incentives such as those in S. 1733, along with existing law, could stimulate larger deployment?

The US Atlantic Offshore Wind Resource

Next I examine more carefully the resource for offshore wind off the US Atlantic coast. This refines the total US national resource estimates in Table 1, and shows that this region does have potential a cost-competitive, near-term, large carbon-free resource. Furthermore, I will show that the regional RGGI carbon regime, a regional version of the bill under consideration by this committee, tipped the balance toward development of large-scale carbon free power, with concommitment economic development and employment benefits.

a. A refined regional estimate of power potential

The DOE figures for the entire US, in Table 1, are based on simplifications that yield quick but approximate figures. A team from the University of Delaware and Stanford University has carried out a more detailed study for the US Mid-Atlantic, from North Carolina through Massachusetts. This has been peer-reviewed and appeared in a major geophysical journal.[7]

We estimated the total offshore wind resource adjacent to the Mid-Atlantic coastal states from North Carolina through Massachusetts (Kempton et al, 2007; attached), as summarized in Table 2. We used 20 years of wind speed data from NOAA buoys, bathymetry (water depths), and sampled data on ocean uses such as shipping lanes or bird flyways that should exclude wind turbines. We assume only machines and towers that are either available or in preproduction prototypes. And, we compared the offshore wind resource against all energy demand of those Mid-Atlantic coastal states, existing electricity uses, plus assign in the assumption that cars would run on gasoline as would building heating; the latter assumptions also lower fuel costs, reduce oil dependence, and reduce carbon emissions.

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[7] Kempton, W., C. L. Archer, A. Dhanju, R. W. Garvine, and M. Z. Jacobson , 2007 "Large CO2 reductions via offshore wind power matched to inherent storage in energy end-uses", *Geophys. Res. Lett.*, 34, L02817, doi:10.1029/2006GL028016.

Table 2. Mid-Atlantic offshore wind resource compared with energy demand (from Kempton et al 2007).

	GW_a
Offshore wind resource	
Offshore wind	330
Electricity needs	
Electric use (existing)	73
Cars (new)	29
Heating (new)	83
Future electric need	185

We found that for the Mid-Atlantic, with a large shallow continental shelf, but with very high levels of population and energy use this detailed regional study showed that the practical offshore wind resource is enough to power all electricity, all gasoline for automobiles, and all fuel oil, natural gas, and other building heating fuels.

I do not supply these estimates in order to say that we should produce this full amount of offshore wind, but to show that the resource is very large. We can build a great deal; we can provide all our electricity, and we can substitute electricity for end uses that now require liquid fuels, yet we would not exhaust the resource. If we developed sufficient wind resources to meet the regions demand for electricity, building heat and passenger automobiles, the Mid-Atlantic would reduce its CO_2 emissions by 68%.

I next review how a regional cap and trade regime helped lead to the first US power contract for offshore wind, then subsequently examine how this industry is scaling up in Europe and how it could do so in the US.

b. Impact of Cap and Trade (RGGI) on the Power Bid in Delaware

In assessing the impact of S 1773 on power and fuel decisions, we in Delaware have the advantage of a short history already with our Regional Greenhouse Gas Initiative, an existing regional cap and trade regime similar to the national proposal in S1773.

The impact of RGGI was felt even before trading began. A Delaware law, "HB 6", required competitive bidding for a new power plant, evaluated primarily on the basis of cost of power and price stability, with only minor consideration given to environmental benefits. Commercial bids were submitted for three power plants, one each using natural gas, offshore wind, and IGCC coal (this proposal was "clean coal" in reduced pollution, but without any carbon sequestration). Costs were compared over the lifetime of each generator. That is, the Commission used Energy Information Agency, RGGI and other sources to estimate the likely cost to ratepayers, including fuel price increases and expected RGGI carbon costs. Cost analysis of the original proposals can be found in the Commission's reports.[8]

The offshore wind bid, by designing to large-scale power plant size, 450 - 600 MW, was able to achieve economies of scale and serial production. On the other hand, the coal plant, despite the advantage of cheap coal, was the most expensive, in part because it was assessed the likely cost of carbon dioxide emissions over its lifetime (several metrics were used, with levelized values ranging around $10/metric ton).[9] The natural gas bid was the least expensive per MWh, but was eliminated largely because it failed the price stability criterion. With the RGGI payments included, the price for IGCC coal was higher than the price for large-scale offshore wind. Nevertheless, the RGGI carbon price was not high enough to justify the coal proposal adding carbon sequestration. Rather, the coal bidder found it lower cost to emit all the CO2 and pay for the carbon allowances.

Ultimately, the offshore wind bid was selected by the Delaware PSC. The developer estimated that building it would create approximately 500 direct jobs during construction, and that operations and maintenance would create 70 direct jobs over the 25-year operation of the facility. If a series of subsequent offshore wind farms were contracted, then additional jobs would be created by local manufacturing of the turbines and blades themselves, now focused in Europe.

In sum, this Delaware state example of a public agency's careful analytic process under a carbon-trading regime offers several lessons for a national program like that in S. 1733:

1. Even modest fees as a result of carbon cap and trade can tip the balance in favor of cost-competitive new technologies (in this case, large-scale offshore wind).
2. Development in Europe has moved offshore wind technology along far enough that it can compete in high-cost electric markets, such as the US Northeast and Mid-Atlantic, with only modest policy incentives.
3. Although offshore wind is generally more expensive than onshore wind, there was insufficient nearby onshore wind to compete in this bulk power bid, and the combination of stronger winds offshore, economies of scale, and policy made offshore wind cost-competitive, even with fossil fuels.
4. The projected RGGI carbon fees were not sufficient to make carbon sequestration cost-effective for coal, but possible future escalation in carbon costs was sufficient to motivate the coal bidder to propose a plant to which sequestration could plausibly be added later as a retrofit.

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[8] Delaware Public Service Commission (prepared by New Energy Opportunities, Inc., et al), 2007, "Report On Evaluation of Bids Submitted In Response to Delmarva Power & Light Company's RFP" PSC Docket No. 06-241. Feb 21, 2007.

[9] The current (2009) RGGI price is $3.09 per ton of CO2; this is about $3.24 per MWh in a conventional coal power plant. (RGGI 2009). The plant lifetime projection was based on the minimum fees forward through the plant lifetime.

5. There are substantial employment benefits from building utility-scale carbon-free power generation.

Pace of Offshore Wind Development & Jobs

Denmark has been developing offshore wind for the past 20 years, and has had wind turbines operating at sea since 1990. Now, Danish, German and French manufacturers have large-scale offshore wind turbines, and large electric utilities are building large-scale offshore wind developments. Countries of the European Union, especially those bordering the Atlantic, the North Sea and the Baltic, are planning on offshore wind as the major technology to reduce carbon emissions from the power sector, and to stimulate economic growth. Table 3 shows facilities in operation, under construction, and planned to come on line in the next six years.

Table 3. Offshore wind operating, under construction, and planned in Europe, 2009 - 2015 (from Windpower Monthly 2009).

Country	Operating in 2009 (MW)	Operating and under construction (MW)	Total planned for 2015 (MW)
Ireland	25	25	1603
United Kingdom	598	2162	8756
Spain	10	10	1976
France	0	105	1070
Italy	0	0	827
Belgium	30	195	1446
Germany	12	769	10298
Poland	0	0	533
Netherlands	228	228	2834
Denmark	414	851	1276
Norway	0	0	1553
Sweden	134	164	3312
Finland	30	30	1330
Total	**1481**	**4,539**	**36,186**

The United States has more offshore wind resource as the countries above. Already, several states in the US areas with shallow waters and few hurricanes have committed to development using existing technology. The map in Figure 1 shows sites with substantial agreements already signed and/or advanced permitting accomplished, totaling about 1,200 MW, which could plausibly be completed by 2015. RPFs or preliminary negotiations are underway that could double this number in this same region, with additional preliminary discussions for the Great Lakes and the Texas Gulf coast.

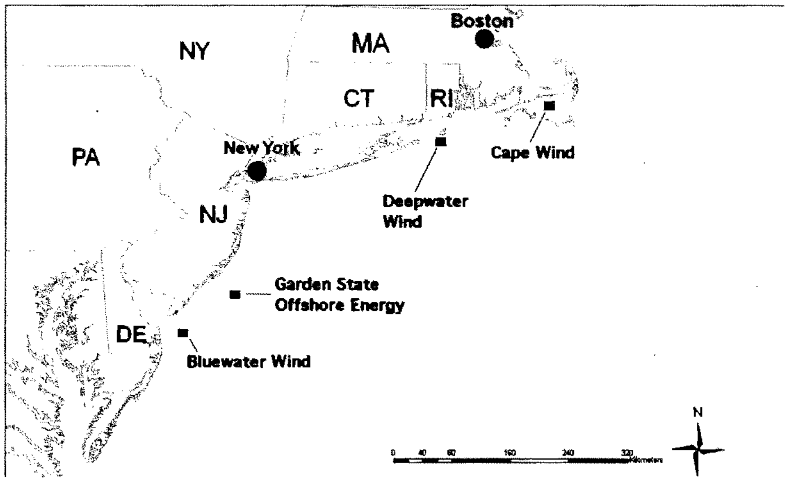

Figure 1. Current US offshore wind projects with permits and/or state agreements (map © 2008, U of Delaware)

Estimates were given above for the employment impact of a single offshore wind project. To estimate the economic impact of a substantial build in the North Atlantic, assume we plan to build enough offshore wind to power electricity and cars but not heat for the coastal states from NC through MA. Based on Table 2, that would be 108 GW_a. To produce 108 GW_a, assuming a 40% capacity factor, would require 54,000 wind turbines each rated at 5 MW, a total capacity of 270,000 MW. Current wind turbine factories running five days and three shifts can produce 350 turbines per year. If we wanted to build 54,000 turbines within 15 years, we would require 10 factories. In addition we would need about 10 factories for blades and 10 for towers. This would be like 10 large automobile manufacturing factories, each employing perhaps 500 people, with approximately a 4x multiplier for indirect jobs among suppliers, a total of 20,000 jobs. These calculations are not meant to suggest that we must build to meet all our needs, nor that we much build this much to be useful. But as a rough calculation, it does show that employment benefits and very substantial reductions in CO_2 are possible in 15 years, from our existing local resources, just by redeploying some of our existing rusting industrial infrastructure.

It may seem that 54,000 is a large number of wind turbines to produce electricity for all these people. But the same states require 22,800,000 housing units to house them (Census 2009), and the adjacent grid operator, PJM, uses 56,300 miles of high voltage transmission lines, about three times that number of high voltage towers, and tens of millions of low-voltage poles, to move power in a similar but overlapping area (PJM 2009).

Federal Policy

Federal policy can help to advance US capability and installation of offshore wind, an example of many job creating new technologies that could be helped by S. 1733 and other Federal policies. Some specifics:

1. A recent Deutsche Bank analysis of investment in clean energy emphasized investors' need for consistency and certainty (Fulton 2009). In the context of. S 1733, if clean power facilities can sell credits, it will be important to have a floor price, so investors can predict a sure cash flow from sale of credits. An assured minimum cash flow is the basis for investments.
2. The same need for consistency and certainty can be applied to in tax policy. The PTC (now with an ITC option) has been extended 2 and 3 years at a time. However, for offshore wind, with a 6-year development period, a 3-year tax window is not helpful. Offshore wind needs a 10 year extension to PTC or ITC, as has been done for nuclear power. Investment in manufacturing for offshore class turbines, towers and blades would require at least 6-7 years of sales to return investment in plant. Thus, the current 3-year PTC extensions limit offshore development, and limit investment in manufacturing. A 10 year extension, possibly limited to ocean renewables, would solve this problem
3. R&D is needed to develop offshore wind turbines that work in more US regions, to improve on current designs, to extend the coastal areas for which we have turbines, to understand the resource, and for policy and public opinion studies. Section 202 of S. 1733 can be used for this purpose.
4. S. 1733 will be help develop new, job-creating and carbon-reducing technologies, by internalizing a modest cost for carbon emissions of competing technologies, by adding R&D funding to advance technology, and by directly incentivizing some clean energy projects.

This testimony is offered on the basis of my expertise; I am not representing the position of my employer nor any organizations with which I am affiliated.

Supplemental material (attached)

1. Kempton, W., C. L. Archer, A. Dhanju, R. W. Garvine, and M. Z. Jacobson , 2007 "Large CO2 reductions via offshore wind power matched to inherent storage in energy end-uses", *Geophys. Res. Lett.*, 34, L02817, doi:10.1029/2006GL028016.

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For further information on offshore wind, see www.ocean.udel.edu/windpower, and www.carbonfree.udel.edu

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Large CO_2 reductions via offshore wind power matched to inherent storage in energy end-uses

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and Mark Z. Jacobson[2]

Received 29 August 2006; revised 5 November 2006; accepted 13 December 2006; published 24 January 2007.

[1] We develop methods for assessing offshore wind resources, using a model of the vertical structure of the planetary boundary layer (PBL) over water and a wind-electric technology analysis linking turbine and tower limitations to bathymetry and continental shelf geology. These methods are tested by matching the winds of the Middle-Atlantic Bight (MAB) to energy demand in the adjacent states (Massachusetts through North Carolina, U.S.A.). We find that the MAB wind resource can produce 330 GW average electrical power, a resource exceeding the region's current summed demand for 73 GW of electricity, 29 GW of light vehicle fuels (now gasoline), and 83 GW of building fuels (now distillate fuel oil and natural gas). Supplying these end-uses with MAB wind power would reduce by 68% the region's CO_2 emissions, and reduce by 57% its greenhouse gas forcing. These percentages are in the range of the global reductions needed to stabilize climate. **Citation:** Kempton, W., C. L. Archer, A. Dhanju, R. W. Garvine, and M. Z. Jacobson (2007), Large CO_2 reductions via offshore wind power matched to inherent storage in energy end-uses, *Geophys. Res. Lett.*, *34*, L02817, doi:10.1029/2006GL028016.

1. Introduction

[2] Recent findings on anthropogenic atmospheric carbon dioxide (CO_2) and near-term commitment to the global change it will bring [*Caldeira and Wickett*, 2003; *Gregory et al.*, 2004; *Thomas et al.*, 2004] increasingly appear to require a response faster than that of historic energy system transformations. The short time scale necessitates beginning deployment with existing or prototyped technologies [*Pacala and Socolow*, 2004]. Wind-generated electricity is a very large, low-CO_2 resource [*Archer and Jacobson*, 2005], with technology already commercialized and economically-competitive [*Berlinski and Connors*, 2006]. Thus it holds the promise to significantly displace CO_2-emitting fuels within the available time. Here we assess the practical size of that resource over the ocean and its match to the energy demand of urbanized coastal states.

[3] From first principles, offshore wind should be of interest. Terrestrial wind resources are most abundant in mid-continental plains, but human populations concentrate along the coasts. The lower surface roughness of the ocean compared with virtually all terrestrial surfaces causes near-surface ocean winds to be faster and less variable [*Prior and Barthelmie*, 2002]. Disadvantages of offshore wind include: higher installation and maintenance costs in comparison with land sites, undeveloped regulatory regimes over water, technology not yet optimized for water locations, and immature offshore wind resource assessment methods. Here, we address the lattermost shortcoming.

[4] Estimating wind resources over water is fundamentally different from estimating mineral resources or wind resources over land. The location of minerals, and of most terrestrial winds, are determined respectively by geological processes and topography. Oceanic wind speeds vary with latitude, with weaker winds near the equator and strongest oceanic winds from the polar air masses through the mid-latitudes, including the populous eastern coasts of Asia and North America (NASA Surface meteorology and Solar Energy: Methodology, 2004, http://eosweb.larc.nasa.gov/cgi-bin/sse/sse.cgi?na+s06#s06). Within those latitudes, regional offshore winds are remarkably uniform (R. Garvine and W. Kempton, The wind field over the ocean as a resource for electric power, manuscript in preparation, 2006) (hereinafter referred to as Garvine and Kempton, manuscript in preparation, 2006). Thus, the oceanic wind resource is unlike minerals or terrestrial winds. It is not restricted to select locations—it is relatively uniform through a region. Thus, resource location and assessment become an inverse problem, of understanding exclusions and limitations on turbine placement, e.g., wind tower technology limits on water depth, competing human uses of ocean space, and wildlife or ecological vulnerabilities.

[5] To develop and test a systematic oceanic wind assessment, we select an area off the United States especially suitable for offshore turbines, due to large shelf and lack of category 5 hurricanes. This is the Middle Atlantic Bight (MAB), a broad sand and gravel shelf of slope 0.001 extending from Cape Hatteras to Cape Cod. Here we analyze a slightly expanded area, 34° N to 43° N, aligning with the US states of North Carolina through Massachusetts (Figure 1).

2. Model of Wind Speed in PBL

[6] For wind speed, we extrapolate from anemometer data at 5–10 m height to the resource of interest, at the 80–100 m hub height of modern offshore turbines. For extrapolation, we use Garvine's solution for the surface roughness coefficient over the ocean surface (R. W. Garvine and F. Veron, A compact model of the neutral planetary boundary layer for ocean application, manuscript in preparation, 2006), which improves on prior estimates for extrapolating

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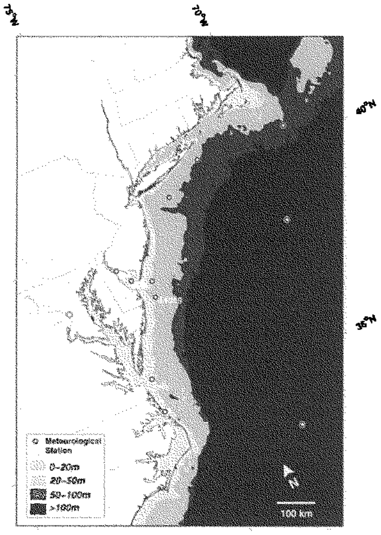

Figure 1. Depth areas of the Middle Atlantic Bight (MAB).

near-surface anemometer measurements to hub height by accounting for stratification, Coriolis parameter (fixed by the latitude), and the geostrophic wind speed and direction aloft.

[7] Wind speeds at all nine NOAA buoys in or near the MAB show a mean of 8.3 m/s (at 80 m height) with SD across buoys of only 0.8 m/s. These are shown in auxiliary Table S3[1], which also shows that our findings are not substantially different if older methods of wind speed extrapolation are used. Given this uniformity, we greatly simplify the electric power estimation by sampling a single buoy with mean 8.2 m/s, slightly below the MAB mean wind speed (and below the mean power output). This buoy, 44009, is used to estimate wind power across the open ocean areas of the entire MAB. We take 21 years of readings at 44009, exclude missing hours (157,079 hours of valid data), and obtain hourly wind speeds. Similarly, we use Delaware Bay weather stations sj and bs, with combined mean wind speed of 7.8 m/s, to represent MAB estuaries (see Figure 1).

3. Bathymetric Areas, Exclusion Areas, and Turbine Spacing

[8] We consider only bottom-mounted wind technology, as floating structures have not been prototyped. Two tower technologies are relevant for water depths beyond a few meters. The tubular steel monopile driven into the bottom is proven to depth of 20 m. A new lattice structure, the "OWEC Jacket Quattropod", has been validated for 50 m water depth and installed in 45 m [*Seidel and Foss*, 2006]. It plausibly scales to 100 m [*Haugsøen*, 2006] (slides at www.ivt.ntnu.no/bat/mb/vindkraft/index.htm) and its cost increases only linearly with depth. Thus, we analyze three bathymetric intervals, corresponding to mounting technologies that are, respectively, current industry practice (0–20 m), prototyped and operating in the ocean (20–50 m), and a scale extension of existing technology (50–100 m). Figure 1 shows these bathymetric regions. Their combined areas, given in Table 1, total 190,300 km^2.

[9] Part of the areas in Figure 1 are not available for placement of wind turbines due to competing uses given higher priority for regulatory, political or economic reasons [*Firestone et al.*, 2004; *Kempton et al.*, 2005]. Full accounting of exclusion areas for the MAB would require a large effort drawing on multiple databases and interviewing. Pending such an effort, we draw on the recent analysis of a sample oceanic and estuary area off the state of Delaware by A. Dhanju et al. (Assessing offshore wind resources: An accessible methodology, submitted to *Renewable Energy*, 2006) (hereinafter referred to as Dhanju et al., submitted manuscript, 2006) to obtain a realistic "exclusion fraction" at each depth range. They excluded major bird flyways, shipping lanes, areas of oceanic ship passage outside of shipping lanes, chemical disposal sites, military restricted areas, zones of unexploded mines, borrow areas for beach renourishment, and visual space from the one major tourist beach. No conflict with commercial or recreational fishing is expected (Dhanju et al., submitted manuscript, 2006). Many of these areas overlap. Our calculated exclusion fractions at each bathymetric interval for the sampled area are shown in Table 1 (also see auxiliary materials), yielding the remaining ocean area available.

[10] All turbines under consideration for new U.S. offshore projects are over 3 MW. The only >3 MW machines already tested in the ocean are the General Electric 3.6s and the REpower 5M, with "nameplate power" (maximum output) of 3.6 MW and 5 MW, respectively. Blade diameters are 104 m and 126 m, respectively. To minimize interturbine wake losses, we impose minimum spacing of 10 rotor diameters downwind, and 5 cross-wind [*Manwell et al.*, 2002]. This spacing corresponds to 0.54 km^2 per 3.6s turbine (close to the value for the Cape Wind layout [*U.S. Army Corps of Engineers*, 2004]), or 0.79 km^2 per 5M. These yield the turbine counts in Table 1.

4. Power Output

[11] To calculate power output, we use the published power curve of each manufacturer, giving power output as a function of wind speed. The best fit function was a combination of two 3rd order polynomials, mapping hourly wind speed to power output. Average output power is a more useful resource measure than nameplate power capacity. Offshore wind operating experience shows < 2% turbine downtime for maintenance [*Larsen et al.*, 2005], mostly scheduled at low wind times, so we ignore this factor.

[12] Using the multi-year wind speeds from section 2 as input to the power equations, we find average output for the GE 3.6s is 1.420 MW, and for the REpower 5M is

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[1] Auxiliary material data sets are available at ftp://ftp.agu.org/apend/gl/2006gl028016. Other auxiliary material files are in the HTML.

Table 1. Calculated Surface Area (Ocean + Estuary), Exclusion Fraction, and Power for the Depth Regions of the MAB in Figure 1[a]

	0 to 20 m	20 to 50 m	50 to 100 m	Total
Ocean + estuary area (km^2)	31,900 + 13,600	75,260 + 2140	67,400	190,300
Exclusion fraction	.46	.40	.10	n.a.
Remaining area available (km^2)	17,226 + 7,344	45,156 + 1,284	60,660	131,670
3.6 s turbines (count)	31,900 + 13,600	83,622 + 2,378	112,407	243,907
3.6 s average output (GW)	45 + 17	119 + 3	160	344
5M turbines (count)	21,805 + 9296	57,159 + 1,625	76,835	166,720
5M average output (GW)	43 + 17	114 + 3	153	330

[a] Power is average output, not nameplate capacity, over 21 years of wind speed at 80 m hub height for a sampled mid-range buoy.

1.987 MW, corresponding to capacity factors for these turbines in the oceanic wind regime of 0.394 and 0.397, respectively. A similar calculation for the estuaries of the MAB, also sampled, yields mean power for each machine of 1.28 MW and 1.79 MW, or capacity factors about 0.36. From the turbine count and power per turbine (ocean + estuary), we find the region's average power output to be 344 GW or 330 GW (Table 1). This is three times a prior unpublished approximation of 260 GW nameplate power, which did not analyze bathymetry, exclusion areas, or average output [*Musial*, 2005]. We use our lower power figure, 330 GW average output, to compare first with regional fossil fuel resources, then with power demand. (Average power output can be multiplied by 8760 h/y to yield annual energy produced in GWh/year.)

[13] Comparing wind power with other regional resources, the oil and natural gas of the Atlantic Outer Continental Shelf (OCS), estimated as "undiscovered technically recoverable," is distributed over twice the area of the MAB, and comprises 6% of US OCS reserves. Table 2 compares wind, OCS oil, and OCS natural gas as sources of electricity. The diverse source energy units in Table 2 are converted to GW of electricity, assuming 20-years' production and losses in conversion to electricity and transmission as shown– yielding delivered electricity from each resource on the bottom row. The MAB wind resource offers over five times the electricity of the Atlantic OCS oil and gas, or over 10 times based on power per area.

5. Matching Oceanic Wind to Human Energy Use

[14] Next we compare the MAB wind resource with current regional electric load, as well as non-electric energy uses that could be substituted by electricity. The light vehicle fleet and low-grade heat in residential and commercial buildings are now supplied primarily by fossil fuels. They could be electrified by using battery and plug-in hybrid vehicles, resistance or heat pump space heating, water heating, electric cooking, etc. To minimize replacement costs, these end-use devices could be replaced at time of wearout, during deployment of the wind resource. If electrified, these loads would also improve the match between electrical load and wind supply, for four reasons: space heat is needed at times of greatest MAB wind supply (Garvine and Kempton, manuscript in preparation, 2006), space conditioning and water heat can be interrupted on an hourly scale under grid operator control [*Kempton et al.*, 1992], added thermal storage at end-use is typically inexpensive [*Ryle*, 1977; *Reddy et al.*, 1991], and vehicle batteries can be charged from and discharged to the grid with timing that matches wind to load [*Kempton and Tomić*, 2005a]. Here we do not address the many complexities of these end-use substitutions. Our first question is whether the MAB wind resource is of sufficient size to displace these end uses currently met by fuels.

[15] Table 3 gives electrical load, light vehicle fuels, and building fuels for the coastal states of the MAB (MA, RI, CT, NY, NJ, DE, MD, DC, VA, NC). Conversion and transmission losses are incurred in moving from the source to work: 0.25 oil well to driveshaft efficiency for the light vehicle fleet, and 0.7 or 0.8 for heating oil and natural gas to low-grade heat. Adding across the lowest row, total demand is 185 GW of delivered power. Assuming that wind electricity could deliver vehicle shaft power at 0.75 efficiency and building heat at 0.9 efficiency (assuming electric resistance heating), this would require 212 GW of electricity from the wind turbines. (The 0.75 efficiency of electric drive assumes plug-in battery vehicles—for H_2 fuel cell vehicles the efficiency is 0.25, so an H_2 fleet would require three times the source electricity.) Thus, displacing all electricity plus all these fuel uses would consume, on average, 212 GW, or 64% of the 330 GW MAB wind resource. Thus, the wind resource offers a potential to displace all these end-uses, plus provide for 50% regional energy-use growth over the present.

6. Managing Fluctuating Wind Power Output

[16] To supply such a large fraction of electrical load, the fluctuating wind resource must be levelized and matched

Table 2. Power Source Comparison: Wind, Oil, and Gas off the U.S. East Coast, If Used to Generate Electric Power

	Offshore Wind in MAB	Oil in Atlantic OCS	Gas in Atlantic OCS
Capacity (native units)	835 GW	$3.8 \cdot 10^9$ BBL[a]	$37 \cdot 10^{12}$ cf[a]
Resource lifetime (years)	∞	20	20
Capacity Factor	.395	n.a.	n.a.
Power at source (GW units)	330	37	64
Efficiency to deliver electric power	.9	.5	.6
Delivered power (GW)	297	18	38

[a] Minerals Management Service, Offshore Minerals Management Program, Report to Congress: Comprehensive Inventory of U.S. OCS Oil and Natural Gas Resources (Report to Congress required by Energy Policy Act of 2005, Section 357, February 2006).

Table 3. Power Use of States Bordering the MAB for Electricity, Personal Transport, and Heat (MA Through NC, Plus DC)[a]

	Electric Load	Light Vehicles	Building Heat (Distillate Fuel Oil)	Building Heat (Natural Gas)
Demand at source (native units)	(mixed)	$601 \cdot 10^6$ BBL/y[b]	$162 \cdot 10^6$ BBL/y[c]	$2.21 \cdot 10^{12}$ cf/y[d]
Efficiency to convert & deliver	(mixed)	0.25	0.7[e]	0.8[e]
Delivered power to meet need (GW)	73	29	22[f]	61[f]

[a] Differing fuel units are converted to year-round average GW of power delivered at the site of work (e.g., delivered electricity, building heat, or vehicle drive shaft motion).

[b] US Energy Information Administration, State Energy Consumption, Price, and Expenditure Estimates (SEDS), "Table F1: Motor Gasoline … 2002" (http://www.eia.doe.gov/emeu/states/_seds_updates.html), 2006.

[c] Residential + commercial is $5.06 + 1.76 \cdot 10^9$ gallon distillate fuel oil in 2004. Energy Information Administration, Fuel Oil and Kerosene Sales 2004, DOE/EIA-0535(04), Tables 7 and 8 (November 2005).

[d] US Energy Information Administration, "Natural Gas Navigator", Natural Gas Consumption by End Use 2005. http://eia.doe.gov (Sept 2006).

[e] Based on space heating: annual fuel utilization efficiency (AFUE) of stock 0.5 to 0.75, AFUE for new code is 0.8; gas is about 0.10 better than fuel oil.

[f] Our use of year-round average power is a simplified but potentially misleading metric here due to the highly seasonal nature of these loads. A more complete analysis would compare the winter wind peak with space heat load peak.

with load. Because wind speed cross-correlation drops with distance [*Giebel*, 2000], distributed wind resources, connected by electrical transmission lines, produce more level power than their individual constituent sites [*Kahn*, 1979; *Milligan and Factor*, 2000; C. L. Archer and M. Z. Jacobson, Supplying baseload power and reducing transmission requirements by interconnecting wind farms, submitted to *Journal of Applied Meteorology and Climatology*, 2006]. Figure 2 shows this via generation duration curves of up to 6 MAB wind sites. The hourly power output of turbines at 1, 3, and 6 sites, all normalized to a single 3.6 MW turbine, is plotted in left-to-right order of hours from highest to lowest power. For each number of sites, the best combination of sites is picked, based on the most consistent capacity during summer peak load hours. Figure 2 shows that for the single site (black line), 13% of hours are at maximum output but 15% of hours are off (below cut-in speed of 3.5 m/s). For 3 and 6 connected sites, the power is off only 2% and 0.3% of the hours, respectively. Since the off-time for all multi-site combinations is well under the 6% forced outage time for baseload fossil generators [*North American Electric Reliability Council*, 2005], it is incorrect to call power from these interconnected offshore wind sites "intermittent." Rather, the problem is that the fluctuations in the wind resource are not matched to fluctuations in load, whereas fossil plants are scheduled to match load.

[17] There are several ways to match fluctuating supply to load without the expense of building dedicated storage or backup generation; here we suggest one combination of methods as an illustration. A light vehicle fleet of battery, plug-in hybrid and/or hydrogen fuel cell vehicles would have substantial energy storage, which could be controlled by the electric grid operator when the vehicle is idle and plugged-in [*Kempton and Tomić*, 2005a]. Assume 2/3 of the $29 \cdot 10^6$ registered automobiles in the MAB region [*U.S. Census Bureau*, 2006] were electrified with 30 kWh storage, and assume that at any one time when needed, only half of these electrified vehicles could respond, each providing half their storage. This is a 145 GWh storage resource, capable of carrying the average 73 GW electrical load for 2 hours. Prior analysis of one such large-scale example showed that electrified vehicles would be sufficient for wind backup all but 5 times/year [*Kempton and Tomić*, 2005b]. For the occasions when vehicle storage is inadequate, today's fossil fuel plants could be retained in standby mode and tapped several times per year. The inverse problem, excess wind power, would first supply any deferred demand for heat and vehicle battery charging; any subsequent remaining excess wind power would be sold on regional markets, or spilled.

7. Reduction in CO_2 Emissions

[18] The total effect of these changes in electric supply and end-use conversions on climate stabilization are estimated from US national data, assuming greenhouse gas (GHG) proportions by sector in the MAB region are similar to national ones [*U.S. Energy Information Administration*, 2004]. In 2004, US CO_2 emissions were $5973 \cdot 10^6$ metric tons (MMT), with CO_2 being 84% of the US anthropogenic GHG climate forcing. To estimate the effect of wind-supplied electricity, light vehicles and building fuels, we sum all energy-related emissions from the residential and commercial sectors, the gasoline fraction (60%) of transportation, and the electrical fraction (38%) of industrial. This sum is $1212 + 1024 + (.60 \cdot 1934) + (.38 \cdot 1730) = 4053$ MMT, a reduction of 68% in CO_2 emissions (4053/5973), or of 57% in total anthropogenic GHG. The range of GHG reductions needed to prevent catastrophic effects of climate change is estimated to be a 60 to 80% reduction from 1990 levels. Our approach, comprehensive analysis of one resource in one region in conjunction with matched end-use fuel substitutions, yields a larger percentage GHG

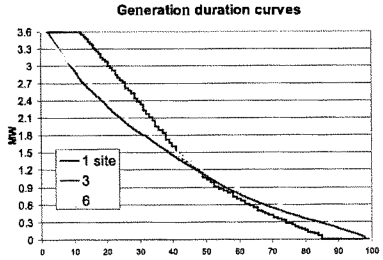

Figure 2. Generation duration curves for a single site (black) and for 3 (dark grey) and 6 (light grey) interconnected sites in the MAB. For each curve, the percentage of hours shows that the given number of sites will generate at least that much power.

reduction than a projected sum of 15 changes, not based on resource size nor regionally specific [*Pacala and Socolow*, 2004]. Additional comprehensive analyses, of resources and end-use substitutions in other regions, seem warranted.

[19] **Acknowledgments.** This work was supported by the UD College of Marine and Earth Studies, the Delaware Green Energy Fund, Delaware Sea Grant, and the Global Climate and Energy Project at Stanford University. We thank C. K. Sommerfield for insights on shelf geology, Brian Parsons and colleagues at NREL for advice on Peak Capacity Factor, and J. T. Reager and Michelle Overway for computational support.

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Senator BOXER. That was a good summary. Thank you.

Our next witness will be introduced by Senator Max Baucus.

OPENING STATEMENT OF HON. MAX BAUCUS, U.S. SENATOR FROM THE STATE OF MONTANA

Senator BAUCUS. Thank you very much, Madam Chairman.

I would like to introduce Bob Winger. Bob is President of Local 11 Boilermakers in the State of Montana. He travels all over the country, frankly, all the ways from Billings, and travels all over installing boilers, which is helping lots of different technologies around the country.

He is also an avid outdoorsman. All of us in Montana are; we hunt and fish. And as Bob knows, we are right in the middle of hunting season. I am sure, although he very much appreciates being here, he also would like to be back home.

[Laughter.]

Senator BAUCUS. And I think he will probably head home pretty quickly. But he is a terrific guy, I have known him for a while. And I am very glad, Bob, that you are here.

So I just ask that the rest of the panel just join me in welcoming Bob Winger. He is a very good man.

I might say, Madam Chairman, that we are here, and the interest we Montanans have is pretty deep, especially as we transition to a clean energy economy, and we are concerned about transportation and also international actions.

Our State has a lot to gain and a lot to potentially lose from this transition if it is not properly structured. The Department of Energy estimates that Montana's wind energy, and it was very interesting to hear about offshore, Dr. Kempton, but Montana's wind energy potential ranges from good to excellent to superb, but it lacks some of the transmission infrastructure required to carry that renewable resource to market. And the thought occurred to me as I listened to you, Dr. Kempton, my gosh, with all those windmills offshore, is how are we going to get that power onshore.

Our State's vast coal reserves have been the lifeblood of our Nation's electricity generation system for decades. In fact, our Governor is fond of saying that we have more BTU in Montana coal than there is in the Middle East. There is a lot of energy locked up in Montana coal.

We provide low sulfur coal that allows coal-fired utilities to meet tough sulfur dioxide standards. Our BTU content might not be quite like our water content. We have low sulfur coal, which we deeply are very proud of. Our coal is plentiful, and it is low cost. It is low cost input for generating electricity, but unless we take steps to develop clean coal technology we run the risk of excluding coal from our energy mix the next century, which is clearly a risk we can't afford.

I am very pleased that the Chairman's mark advances the development of clean coal technology. Specifically, the package provides for advance payment of bonus allowances to a greater number of carbon capture and storage projects than does the House package. And I want to thank Senator Carper for helping to negotiate, and Senator Udall helping to negotiate that package.

This will speed the commercial development of this technology and reduce investment risk.

The coal package in the Chairman's mark also makes some changes to the performance standard for new coal-fired power plants by delaying the early trigger, but accelerating the backstop for this standard to take effect. I think those are two important provisions.

There were compromises on both sides in this package, and I am proud to lend my support for those provisions. And I know that each of my Democratic colleagues share that view.

The coal provisions in this bill are one example of where the middle lies on climate legislation, and I hope that we can mirror our success in this section in other parts of the bill as we move forward.

So thank you, Madam Chairman. I am glad you got what I am saying.

Senator BOXER. I sure did.

Senator BAUCUS. I look forward to hearing from our witnesses today.

Senator BOXER. I did, Senator, absolutely. And we have some new information we are going to share with your staff, which may make you very happy in terms of what the reduction is in the bill. But we will talk more about that. I so appreciate your being here.

Mr. Winger, it took a little while, but I think it was important to hear from Senator Baucus, so please go ahead.

STATEMENT OF BOB WINGER, PRESIDENT, INTERNATIONAL BROTHERHOOD OF BOILERMAKERS, LOCAL 11

Mr. WINGER. My name is Bob Winger. I am President of the International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers, Local 11, located in East Helena, Montana.

On behalf of the members of my Local and our unions International President Newton B. Jones, I want to thank Chairwoman Boxer, Senator Baucus and the members of the committee for the opportunity to testify at this important hearing.

I have been a boilermaker for 28 years. Boilermakers are a highly skilled, highly paid trade: welding, rigging, fitting steel in heavy industry. I have worked in over 20 States, building and maintaining power plants, refineries and paper mills.

It is a career that has allowed me to be solidly in the middle class with good health insurance, a fixed pension, annuity, and above average wages, enabling me to help two daughters through college, and the youngest is in her third year. Good blue collar work.

Opportunities for Americans to get and hold these types of jobs have disappeared. These are the types of jobs that can flourish with the passing of this legislation. Coal-powered generation is clean, cheap, dependable and job intensive. Over the years, the coal industry has met the challenges of cleaning up emissions: SO_2 with scrubbers, NO_x with SCRs, particulates with bag houses, and in some States, including Montana, mercury reduction units.

As emissions were identified and regulations enacted, solutions were created. Those solutions are the jobs this country desperately needs. I will take scrubbers as an example. As soon as the rules identifying levels of SO_2 that must be met and a reasonable timeframe was set, American ingenuity kicked in. General equipment and methods are designed. The equipment is engineered to fit specific power plants. Blueprints are drawn up. These are good white collar jobs for our college graduates.

Steel is made in steel mills then sent to shops where it is fabricated into parts, which are shipped to the plants, where they are put together. The new unit is then put online, reducing the targeted emissions, very job intensive through the blue collar sector.

As scrubbers were built, they became cheaper and more efficient through lessons learned. Once these add-ons to existing plants are built, they must be operated and maintained, making more jobs.

This same process will work for carbon capture and storage. There are over 600 coal-fired plants in the U.S. Think of the millions of man years of work to build, operate and maintain carbon capture and storage units on these plants.

Happily, this legislation addresses the need to help our main baseload power generation source, coal, to clean up. Any legislation to reduce greenhouse gases that does not recognize the reality that coal is, will and should be our primary fuel for power generation is misleading.

We need to take the lead in developing the technology and building the carbon capture and storage units. As leaders, we can sell our technology to the developing countries, resulting in actual global reduction of CO_2. This legislation sets the ground rules, thereby removing the uncertainties. In Montana, we had the Highwood Generating Station, a 250-megawatt fluidized bed coal-fired power plant forced to be canceled by lawsuit after lawsuit in an uncertain regulatory environment. This plant would have been one of the cleanest in the Nation for the pollutants already regulated by the EPA.

In addition, I was assured by the developers, Southern Montana Electric, that they would install CCS when it became commercially available. The developer cited the aura of uncertainty surrounding U.S. regulations of CO_2 as a key factor in their decision to cancel the project. Building this plant would have employed boilermakers for about 4 years, peaking at about 160. Its replacement? A natural gas peaking unit that will employ four boilermakers for about 3 weeks.

I have been talking in job numbers relating to boilermakers. That same 250-megawatt power plant would have required hundreds of electricians, pipefitters, iron workers, operators, carpenters, millwrights, sheet metal workers, and laborers. Add to the secondary jobs in the communities where the construction takes place, and we are taking jobs recovery.

Our International has recognized the need to train and recruit workers. In cooperation with PP&L Montana, we are building a training center in Colstrip, Montana. This borders the Northern Cheyenne and Crow Reservations. We plan to train applicants in pre-apprentice programs, basic welding and other skills necessary for a career in our craft.

I am not an expert on this or any legislation. I rely on my Government Affairs Department for that expertise. I am an expert on being employed providing energy to our country, as well as the satisfaction of meeting environmental challenges during my career. Please get this legislation moving with rules and deadlines to remove the uncertainties. Get the investments going. Supply the incentives to jump start the technology through pilot projects. Keep the wages even and fair, utilizing prevailing wages through the consistent application of the Davis-Bacon Act. Protect our manufacturers by preventing carbon leakage at the border. Don't forget our smaller refineries as we divvy up the allowances.

Again, I want to thank you for this opportunity.

[The prepared statement of Mr. Winger follows:]

Statement of Robert Winger
President, International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers, Local 11

Committee on Environment and Public Works, United States Senate

S. 1733, the Clean Energy Jobs and American Power Act

October 29, 2009

My name is Robert Winger and I am the President of International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers, Local 11, located in Helena, MT. On behalf of the members of my union and our union's International President Newton B. Jones, I want to thank Chairman Boxer, Senator Baucus, and the Members of the Committee for the opportunity to testify at this important hearing.

I have been a boilermaker for more than 25 years. During that time I have played a role in building eight coal-fired power generation facilities, and been involved in the maintenance and repair of many others. In addition, I have experience in the installation and maintenance of pollution control technology, such as selective catalytic reduction units to reduce NOx emissions and SO_2 scrubbers. A union job building power generation systems and air pollution control technology enabled me to put two daughters through college.

Our union greatly appreciates the work of Chairman Boxer and Senator Kerry, and all the Senators who contributed to the Clean Energy Jobs and American Power Act of 2009. This legislation is a critically important first step toward enacting a comprehensive policy that will enhance American energy security, begin reducing emissions that cause global warming, and, most importantly for our union, create high-quality job opportunities for American workers. The hearings being held this week represent tremendously important progress toward addressing the biggest environmental challenge of our day.

Establishing Environmental and Economic Certainty

The lack of a clear, comprehensive policy on global warming and the uncertainty associated with the future regulation of greenhouse gases is an economic issue that must be addressed. The uncertainty associated with our nation's energy and climate policy has prevented and delayed much need investments that would put people to work and aid in our nation's economic recovery. Regulating carbon emissions is not without cost. However, the status quo is nothing short of unacceptable. The Senate must demonstrate bipartisan leadership and develop the kind of solutions that will provide certainty, control costs, and encourage job-creating investments in clean energy technology.

For example, in Montana, the planned construction of a 250 MW fluidized-bed coal-fired power plant was forced to be cancelled in the face of legal challenges and an uncertain regulatory environment. The plant would have been among the cleanest in the nation for those pollutants already regulated by the Environmental Protection Agency. In addition, the developers at Southern Montana Electric were willing to commit that the plant would be equipped with technology to capture and store carbon emissions, when such technology was commercially available.

When the project was cancelled, the developer cited the "aura of uncertainty" surrounding U.S. regulation of carbon dioxide as a key factor in their decision. The result was that instead of a plant that would have employed 160 boilermakers for four years, the developer is building a natural gas power plant that will employ four boilermakers for three weeks. Had the legislation we are discussing here today been law, there would have been no questions or doubts about the subsequent installation of carbon capture and storage technology (CCS). It would have been required when the technology was available, and the concerns of at least some of the most vocal objectors to the plant being built would be addressed.

Unless Congress acts, regulated entities will continue to delay investments, and continue to put off job creation opportunities available in clean energy technology. Without clear policies regarding performance standards and emissions limits – including appropriate incentives for the installation of new technology – we could miss an opportunity to make the United States the leader in advanced coal-technology development, an undertaking that is essential to meeting any significant global effort to reduce emissions. In fact, the economic incentives provided under S. 1733 will result in a new generation of energy technology that is cleaner, more efficient and essential to maintaining reliable, affordable energy from coal plants, while reducing emissions that cause climate change.

Ensuring a Future for Advanced Low-Carbon Energy from Coal

This legislation rightfully recognizes the importance of widespread deployment of carbon capture and storage technology to our nation's energy future. I want to thank Senator Carper, Senator Baucus and the other Senators involved in the development of the provisions of this legislation designed to encourage the early, and widespread deployment of CCS technology at coal plants, including new generating capacity and retrofit applications. The deployment of this technology will not only have tremendous environmental benefits, but also will have employment and economic benefits for workers in the building and construction trades, and other industries engaged in CCS development.

First, the performance standards for new coal fired power plants are clear and straightforward. Under the Chairman's mark, plants constructed between January 1, 2009 and 2019 must achieve a 50% reduction in emissions. This requirement will apply to units within four years of certification by the Administrator of the Environmental Protection Agency that there exists commercial scale application of CCS technology at 10 gigawatts of new or treated retrofit electric generating units and industrial sources.

The date by which this requirement takes effect may be extended to 2022 upon determination by the Secretary of Energy and EPA Administrator that such a delay is appropriate. The performance standard also provides for unit specific extensions to provide additional flexibility for units facing technical difficulties in complying with these requirements.

We appreciate that the threshold for the application of this performance standard has been extended beyond what was provided for in H.R. 2454, as the application of CCS technology will require some learning through experience. However, just as the costs and engineering challenges associated with the installation of NOx and SO_2 emissions control technology have become more manageable as our experience has increased, we are optimistic that so will the challenges of commercial CCS deployment.

We also strongly support the inclusion of Sec. 125 of the bill, the Carbon Capture and Sequestration Demonstration and Early Deployment Program. This section creates the Carbon Storage Research Corporation to establish and administer a program to speed the commercial availability of CCS technology. Through revenue collected from a small assessment on distribution utilities for fossil fuel based electricity, the Corporation will fund no less than five commercial scale CCS projects. This program will provide a kick-start to our country's effort to commercialize this essential climate solution.

Finally, our union cannot overstate our support for the inclusion of the bonus allowance program established under Section 780, to provide financial incentives and assistance for the commercial deployment of carbon capture technology. Providing for the advance payment of bonus allowances will provide the financial certainty necessary for utilities to undertake these capital intensive, yet vital projects. It will encourage CCS applications at both new and existing units, and provides incentives for early adopters and projects achieving the highest rate of capture and sequestration. Also, this legislation expands the availability of fixed payments for CCS projects to a greater number of projects, increasing both its environmental and employment benefits. Providing these bonus allowances to cover the entire marginal increase in costs between an advanced coal plant with CCS and a standard, supercritical pulverized coal plant should support widespread adoption of this technology without a significant increased cost to ratepayers.

Let me stress again, that these well designed and thoughtful provisions related to CCS will not only enable significant emissions reductions from the power generation sector, it will have enormous economic and employment benefits, creating job opportunities for millions of skilled workers in the building and construction trades. The construction of coal based generation facilities and CCS technology is tremendously labor intensive, requiring the skills from a wide range of crafts. While any construction employment is by its nature "temporary", CCS projects will be long-lasting job opportunities for workers who are engaged in construction of this technology.

The Boilermakers and other unions whose members rely on coal-fired power for employment recently commissioned a study conducted by BBC Research and Consulting to illustrate the potential jobs and other economic benefits of advanced coal-fuel electric generation using CCS technologies. The study found that the economic benefits from construction of a single 540 MW pulverized coal plant with CCS include employment benefits during the construction phase total nearly 14,000 job-years, with additional annual benefits from operations and maintenance totaling 250 permanent jobs. Similarly, the study found that the job creation potential – including both direct and induced employment – of 20 GW of advanced coal facilities with CCS is 1.4 million job-years. The vast majority of these jobs would be created in the construction sector.

In sum, it is clear that the early deployment and bonus allowance programs for CCS included in S. 1733 will be a major driver for job creation. Any craftsmen will tell you these kinds of projects help not only workers directly employed, but also the businesses in the surrounding community. These projects will provide tremendous economic stimulus in the communities where they take place. I look forward to the day when the Members of Local 11 collect a paycheck thanks to a projected supported by these important provisions, and can be proud that we played a role in controlling carbon emissions from coal plants.

Commitment to High Quality Employment

I know that a lot has been made of the idea of "green jobs." To be honest, for most of the workers I share job-sites with the "green" they are most interested in is the green in their pockets. Of course, it is rewarding to know that the work we will be doing will contribute to long-term environmental sustainability. However, for those picking up welding torches, wrenches, and screwdrivers to build the infrastructure that will enable us to reduce pollution, the most obvious and direct benefit of this legislation will be the paycheck at the end of the week.

Our union greatly appreciates that the sponsors of this legislation not only maintained their long-standing commitment to environmental protection, but also to fair and decent labor standards. Under the Clean Energy Jobs and American Power Act of 2009, workers employed on projects assisted or incentivized through this legislation will be assured wage rates no less than those prevailing in their local community through the consistent application of the Davis-Bacon Act.

This law protects both communities and employers by preventing the undercutting of local standards, and ensuring that federally assisted projects neither drive-down nor artificially inflate wages. This law protects workers in both big cities and rural areas, and protects union and non-union workers alike. In short, Davis-Bacon will ensure that "green jobs" are also good jobs.

Workers on these projects should be well trained and highly experienced – all construction project characteristics encouraged by the Davis-Bacon Act. Numerous studies show that projects built under prevailing wage provisions are more likely to be completed on time, within budget and with fewer future repair costs. Ensuring these high standards for both workers and contractors will be particularly important when applied to new, highly technical construction projects, such as CCS technology. Neither American taxpayers, facility owners, nor the environment can afford anything less than the high-standards ensured by the application of prevailing wages.

Protection for Energy Intensive, Trade Exposed Industries

Among the most significant concerns of our union regarding efforts to regulate carbon emissions through an economy-wide cap and trade program is its impact on energy intensive, trade exposed industries. While the Boilermakers union directly represents workers in the cement industry, other energy intensive industries – such as steel – provide employment opportunities for our construction members. These industries are the backbone of American manufacturing, and a source of high-wage employment for millions of workers and their families.

This legislation rightfully recognizes that these industries need particular assistance in making the transition to a low-carbon economy, as it is more difficult for costs to be absorbed or passed on to consumers without adverse impacts. Therefore, we appreciate the significant allocation of allowances provided in this legislation to address these concerns.

In addition, the bill recognizes that the allocation of allowances is essential, though not sufficient to address all of the concerns related to job losses in the manufacturing sector. This important effort to address global warming will not be effective if jobs and pollution are outsourced to countries that lack our commitment to sustainability. At its core, global warming is the most negative consequence of misguided trade and globalization policies. In addition, simply providing an allocation of allowances to domestic industries would be a missed opportunity to encourage – using both "carrots" and "sticks" – responsible action from major emitters in those rapidly developing countries that are a major source of global emissions.

Recognizing that those provisions fall within the jurisdiction of the Committee on Finance, we believe it is critically important that Congress include a strong, yet fair border measure to prevent so-called carbon leakage. In fact, we would recommend all Senators revisit and consider the trade provision originally included by Chairman Boxer in her substitute Amendment to the Lieberman-Warner Climate Security Act. We believe this approach would provide significant leverage for U.S. negotiators in the context of global climate change negotiations, while remaining consistent with our existing trade obligations.

Finally, on behalf of my fellow union members in the Boilermaker's Cement, Lime, Gypsum and Allied Workers Division, we have some suggestions regarding provisions specific to cement manufacturing, one of the six industrial sectors identified as vulnerable under carbon caps because it is an energy intensive commodity subject to global competition. An additional challenge for cement results because the process of calcining limestone into cement releases carbon dioxide regardless of the energy source it uses. We suggest that this variety of process emissions – emissions that essentially cannot be reduced – not be included under the cap. In addition, we ask that energy-intensity be properly calculated, reflecting actual clinker production from US cement kilns, and that the industry's long-time commitment to alternative fuels be taken into account. We must ensure the production of this strategic commodity not shift overseas. The result of such a shift would be to harm domestic employment, and to increase carbon emissions as less efficient foreign kilns replace more modern domestic ones.

Allowance Allocations

It is critically important that any climate legislation give careful consideration to the allocation and distribution of emissions allowances to both maximize benefits, and minimize costs to consumers. We applaud the committee for rightfully allocating the vast majority of allowances in the early years of the program at no cost. The choice between auction and allocation has little impact on the long-term environmental benefits of the program, but the wrong approach could have serious employment and economic implications for middle-class families as our nation makes this critical transition.

The Boilermakers strongly support the dedication of significant allowance value in this legislation for activities that will create jobs. Of course, most importantly for our union are those allowances dedicated to the deployment of CCS technology. In addition, allowances dedicated for improving energy efficiency will also be a significant driver of employment in the transition to a low-carbon economy. In addition, we appreciate the inclusion of provisions to provide allowances to protect low- and moderate-income families from any energy cost increases, and rebates to consumers.

This legislation also makes critical investments in American workers. It provides support through allowances for job training programs, and assistance for any worker negatively impacted as our economy makes this transition.

Our union believes that the allocation of allowances to electricity consumers through local distribution companies (LDCs) is the most effective approach for preventing increased utility costs for families and businesses. While the formula for distribution of allowances is consistent with the legislation adopted by the House, the overall number of allowances available for this important consumer relief is reduced due to the other purposes for which this legislation dedicates allowance value. While these other purposes, such as debt relief, are certainly important, we suggest the allocations to LDCs for electricity consumer relief be consistent with the level of emissions from the power sector in the early years of the program.

In addition, refineries are also an important source of job opportunities for the members of my union. We are pleased this legislation increases the allowances provided to domestic energy producers, particularly small refiners.

Suggested Improvements

This legislation goes a long ways toward addressing some of our union's highest priorities when it comes to climate legislation. Of course, we have some suggested improvements that we urge the Committee and the Senate to consider.

As was mentioned early in my testimony, a priority of our union is to provide the greatest level of regulatory certainty possible when it comes to the permitting of new power generation facilities. All the resources in the world will not create jobs for anyone but lawyers if every new plant or retrofit is tied up in an endless game of legal challenges and regulatory hurdles.

One key objective of federal climate change legislation must be to establish a new framework for reducing economy-wide greenhouse emissions. In Waxman-Markey, this framework relies on a cap-and-trade program that allows companies to achieve emissions reductions in the most efficient, cost-effective manner possible. It requires the replacement of the existing piecemeal, command-and-control regulations with the new cap-and-trade program.

We believe the House legislation appropriately provided exemptions from permitting and other such air regulatory requirements established for conventional air pollutants under the Clean Air Act. These exemptions were carefully tailored to apply only to greenhouse gas emissions from sources that would be regulated under the new cap-and-trade regime. Unfortunately, Clean Air Act exemptions are missing from S. 1733. The goal of a cap-and-trade program is not just to reduce emissions, but also to do so in the most efficient and cost-effective manner. Failure to address these issues could undermine that goal.

In addition, we believe that an effective cost containment provision is essential to not only limiting the overall economic impact of the program, but minimizing allowance price volatility and discouraging market manipulation. While the Market Stabilization Reserve Auction is a promising approach, we maintain some concern that it will not provide sufficient certainty should prices rise unexpectedly high.

Finally, we have some concern regarding the stringency of the emissions reductions targets in the early years of the cap and trade program. Should the development of CCS technology not proceed quickly enough, these early caps may encourage some plants that could otherwise be retrofitted to shut down or switch to natural gas. Therefore, we encourage the committee to consider an emissions reduction target in 2020 of 14% below 2005 levels, consistent with the program called for in President Obama's budget proposal.

Again, I thank the Committee for the important work you are doing here today, and the opportunity to express my views.

Senator BOXER. Thank you for that excellent testimony.

Our next speaker is Fred Krupp, President, Environmental Defense Fund. I want to note that he has headed EDF for 24 years, and we welcome you.

STATEMENT OF FRED KRUPP, PRESIDENT, ENVIRONMENTAL DEFENSE FUND

Mr. KRUPP. Thank you, Madam Chairman and Senators. I am honored to be here today as you take one more step toward passing U.S. climate change legislation.

In my testimony before you in August, I focused on three major points. We can achieve strong emissions targets for 2020. We can meet those at low cost with technologies that are already available. And we can grow the U.S. economy at the same time.

Today, I want to add more evidence that capping pollution will sustain growth in our clean energy sector and help put the U.S. back in the driver's seat of our global economy.

Earlier this year, EDF launched LessCarbonMoreJobs.org, a snapshot of clean energy companies across the country. To date, we have mapped out thousands of companies in 22 States that are poised to prosper under a Federal cap on carbon. I encourage you to explore the site. You will see that many of the traditional American manufacturers are finding new life for their products in the burgeoning market for low carbon energy.

In addition, EDF engaged a respected market research firm to survey growth in this sector for the past few years. The results are astounding. Here is what we found. In 2008, 42 percent of companies responding said that their sales had grown during the past 2 years. Another 42 percent were holding steady, and only 16 percent had seen a decrease.

Today, the numbers are even better. In August 2009, more than half said that their sales had increased. Another third were holding stead, and only 14 percent had seen a decrease. Many of those reporting growth planned to hire more workers, and this is during the greatest economic upheaval the United States has seen in decades.

Clean energy is a bright spark in our economy, but we need to do more to make it an engine of sustainable economic growth in America and help our companies out beyond our borders. The U.S. historically has been a leader in the world economy because of our ability to innovate, to get there first. But the race no longer ends with a patent. You have to produce the product to capture market share.

We have always been a leader in intellectual property. U.S. inventors hold half of all clean energy patents for much of this decade. Japan was second, with 29 percent, and Germany third with only 9 percent. Yet our leadership in intellectual property today is not translating into leadership in manufacturing. Here is an example. We hold more than 40 percent of the patents for solar energy technology. China holds less than 5 percent. Market share used to track that trend line. The United States had 28 percent of the global market share for solar sales in 2001, and China owned only 1 percent. By 2008, though, the market share had flipped. The U.S. held only 6 percent, while China grew to 29 percent.

Winning the patent race is not enough. We must convert that intellectual capital into market share. We need to create the internal demand that will give U.S. companies the customers they need to grow, and we can do that right now by capping carbon emissions.

The stakes are high. The annual clean energy market could reach $500 billion in 2020 with a global effort to curb carbon emissions. The race to gain advantage has begun, and we need a U.S. cap to win that race.

I have led EDF now, Madam Chairman, this month for 25 years, and over that time, I have become a strong believer in the power of American entrepreneurs when given a clear goal to meet and the flexibility to determine how to get there.

S. 1733 sets a strong target for reducing pollution. It rewards companies who can achieve the goal. It holds accountable those who don't. It is the same formula that tackled acid rain under the Clean Air Act, faster and at lower cost than anyone predicted.

We know from rigorous analysis that we can meet our climate goals with existing technologies at low cost. We know that we can build those technologies here in the U.S. and sell them throughout the world.

Solving problems, as Bob just said so eloquently, is how we create new industries. It is how we create jobs. Let's roll up our sleeves and do it.

Thank you.

[The prepared statement of Mr. Krupp follows:]

Written Testimony of Fred Krupp
President, Environmental Defense Fund
before the
U.S. Senate Committee on
Environment and Public Works

October 29, 2009

Outline of Testimony

My testimony today builds upon the three points I made in my written testimony for the August 6, 2009 hearing of the US Senate Committee on Environment and Public Works. In that testimony I made three main points:

1. **Overwhelming evidence shows that we can meet 2020 emissions targets.**
2. **We can achieve these emissions targets at low cost.**
3. **We can create jobs – while we achieve the emissions targets.**

In today's testimony, I would like to augment that testimony with additional evidence that:

1. **The US clean energy sector is poised to grow,**

and in doing so…

2. **The US has an opportunity to increase its share of the global clean energy market.**

Because my testimony today is adding to and enhancing my August 6, 2009 testimony, for completeness, I am incorporating my new material into that text which is reproduced below.

So readers should note the following additions: in the Executive Summary, on page 2, a new third paragraph under point #2 summarizing the recent EPA analysis of S.1733; on page 7, a new paragraph further describing the recent EPA analysis of S.1733; beginning on page 8, an updated comparison of other macroeconomic modeling; beginning on page 13, a new section on energy efficiency experience; and finally beginning on page 21, a new section 4, *The Clean Energy Economy - Poised to Grow.*

Executive Summary

My testimony today makes three main points.

1. **Overwhelming evidence shows that we can meet 2020 emissions targets.**

The bill recently passed by the House, H.R. 2454, and similar bills in the Senate, have been analyzed by many different sets of economists and engineers. Using different models and different assumptions, these studies all reach the same conclusion: we can reduce U.S. greenhouse gas emissions by 17%, 20%, or more by 2020, as compared to 2005 emissions. One of the most powerful tools for reducing emissions is also the most familiar: energy efficiency.

2. **We can achieve these emissions targets at low cost.**

The most authoritative study of the House legislation, by the EPA, shows that – even ignoring the costs of doing nothing, which are very large – the bill's annual cost to the average household will be just $80 to $111 (in present value). That's just 22 to 30 cents a day for the average American family – less than the cost of a postage stamp. To put it another way, it's about *a dime a day per person*. And because of special protections for low-income families, the lowest quintile of households will actually see a small net benefit from the bill.

Perhaps even more notably, the EPA analysis projects that under H.R. 2454, consumers will actually *save* money on their utility bills in the short run (through the year 2020), compared to business as usual. That's because even as the bill will keep household energy prices low, it contains other provisions to help boost energy efficiency and reduce energy consumption.

Last Friday EPA released its review of the economic impacts of S.1733 comparing S.1733 to the House bill H.R.2454. Its assessment of the two bills concluded that a full economic analysis, using EPA models, would likely show that the impacts of S. 1733 would be similar to those estimated for H.R. 2454. EPA's analysis, consistent with others, confirms that the US can enjoy robust economic growth while making ambitious reductions in global warming pollution. The investment in the clean energy economy will pay enormous dividends in energy security, new jobs, and a livable planet for our children and grandchildren.

And study after study shows there are readily available tools to achieve emissions reductions at modest cost. One of the most powerful is energy efficiency. McKinsey & Company's latest analysis, for example, focuses solely on energy efficiency measures – and finds that we could achieve the required reductions by 2020 solely through energy efficiency measures, at low or even *no* net cost.

Part of the low cost is because good program design lets you get the biggest bang for the buck. A new Duke University policy brief released this week found that just 1.3% of all U.S.

manufacturers emit enough GHGs to be included under the threshold of 25,000 tons specified in ACES. Yet that 1.3% – about 4,500 of 350,000 manufacturers – is responsible for 82.5% of all manufacturing emissions.

3. **We can create jobs – while we achieve the emissions targets.**

Building a low-carbon economy can be a major – perhaps *the* major – economic driver for the U.S. economy over the next few decades. That's because behind every low-carbon solution is a long supply chain brimming with American jobs. A pioneering set of studies by researchers at Duke University has laid this out in detail. As the Duke studies show, low-carbon solutions – from energy-efficient windows to carbon capture and storage – will spawn new jobs in mining, component manufacturing, final product manufacturing, design, engineering, construction, marketing, and sales.

Introduction

I am honored to be here today as this Committee considers ways to combat climate change and ensure the United States leads the world in the coming clean energy revolution.

The stakes could not be higher. Already we are seeing signs of a changing climate – in the melting glaciers of our mountains, in the open waters of the Arctic, in dying coral reefs off south Florida and in disappearing terrestrial ecosystems. We see those signs in killer heat waves such as those that hit Europe a few years ago, and in droughts and disruption to agriculture in much of the world today. If we fail to act, we will commit our children and our children's children to a planet that is unrecognizable from the one our parents and grandparents knew. Inaction is simply not an option.

And yet my message is one of optimism and hope. As a nation, we've met challenges before and forged a stronger and more vibrant economy as result. That opportunity is before us again. By passing a comprehensive cap-and-trade program to control greenhouse gas emissions, we will unleash the enormous innovation and entrepreneurial drive of the American economy. Building a new energy infrastructure will mean jobs and investment right now, right here at home. And a cap-and-trade program will position us to lead the world into the clean energy economy, providing the technologies and the talent that will be in high demand throughout the world over the coming decades.

With the right policies in place, we can look forward to a fierce battle among brilliant scientists and entrepreneurs to make their names – and their fortunes – by making clean energy more affordable. Last week, for example, Robert Nelsen, co-founder of a venture capital firm, told a House committee that a start-up company's own tests show that it has developed a way to generate solar power at about half the cost of today's technology. Another company, Ausra, is betting that concentrated solar power will be the ticket to clean energy, and recently backed up that bet by building a factory in Las Vegas that has employed as many as 150 people. Still another firm, Verdant Power, is working on harnessing the power of the tides to generate low-carbon energy.

Though the opportunities for innovation and entrepreneurship are vast, the challenge before us can seem daunting. Science tells us we must reduce our emissions of greenhouse gases by 80% below current levels by the middle of this century, if we are to have an odds-on chance of avoiding dangerous tipping points in the climate system. To be on track to achieve that long-term goal, we must start cutting emissions throughout the economy as soon as possible, and bring them down to 17 to 20 percent below 2005 levels by the year 2020.

In my testimony today, I look at the best available evidence on how we can achieve that 2020 target. The record is clear: with known technology, we can meet and exceed that goal. And putting a cap on carbon will stimulate a spate of new technologies – and new business methods, like third-party financing of energy efficiency improvements – that will only strengthen our hand. In doing all this, we will build a stronger and more prosperous American economy.

Below, I provide the details behind those conclusions. I start by looking at the evidence from several different economic analyses of the opportunities for early emissions reductions. Although these studies make dramatically different assumptions, they reach the same conclusion: the potential for reducing emissions is vast. We have the technologies to get started now, and to achieve big reductions in emissions at low cost over the next decade. And with an emissions cap that results in a price on carbon, we will generate new tools that will do so even more efficiently.

In effect, these studies offer a road map to achieve a 2020 target of reducing emissions by 17 to 20% below 2005 levels, even without the innovation that we know will come.

That many independent studies reach the same conclusion gives us enormous confidence that achieving a 2020 target does not depend on a single set of assumptions or a single silver bullet. Rather, there are multiple ways to get to where we need to go. What matters is that we get started now.

After taking stock of the macroeconomic evidence, I then hone in on two particular areas that could make major contributions to achieving our goals: energy efficiency and carbon capture and storage. (Carbon capture and storage, or "CCS," means capturing carbon dioxide at power plants or factories and pumping it into underground geological formations for long-term storage.) Each of these areas can dramatically reduce emissions while creating jobs and establishing American technological leadership.

A key point in all of this is that, contrary to doomsday predictions from extremist think tanks, the costs to American households of capping greenhouse gases will be minimal: less than the cost of a postage stamp per day. The EPA's analysis of the clean energy bill passed by the House says that, over the entire life of the bill, the annual cost to the average household will be just $80 to $111 (in present value). That is just 22 to 30 cents a day for the average American family – less than the cost of a postage stamp. To put it another way, it's about a dime a day per person. And according to the Congressional Budget Office, the bill's special protections for low-income families mean that households in the lowest income quintile will see an average annual net *benefit* from the bill of about $40 in 2020.[1]

A final word on timing: the rest of the world is watching our political process closely, because our leadership is crucial to achieving an international agreement on reducing greenhouse gas emissions. The key date is this December, when U.S. negotiators will meet with their counterparts from around the world in Copenhagen. I strongly urge the Senate to work with the House and the President to pass a strong climate bill before the Copenhagen conference convenes in December.

1. The potential for low-cost abatement

With just the technology we already have, we can meet a 2020 target of reducing emissions by 17 to 20% below 2005 levels. That conclusion emerges from analyses by the Environmental Protection Agency (EPA), the Department of Energy's Energy Information Administration (EIA), the Massachusetts Institute of Technology (MIT), and McKinsey & Company. Each of these studies projects that the necessary emissions reductions can be made, at marginal costs as low as $18 per ton. In fact, these studies estimate that the abatement potential far exceeds the roughly 1 billion tons needed to meet a 17% target.

In the formal macroeconomic modeling done by EIA, MIT, and EPA, emitters are expected to overcomply with emissions targets in the early years of a cap-and-trade program to build up an allowance "bank" that will keep costs low when targets tighten later on. In fact, while there is ample potential for international emissions reduction credits,[2] the U.S. can meet or beat the 2020 target based on domestic emissions reductions alone.

Crucially, none of these studies take into account the innovation and technological breakthroughs that will be unleashed by putting a cap on carbon. I return to this point below, in my conclusion.

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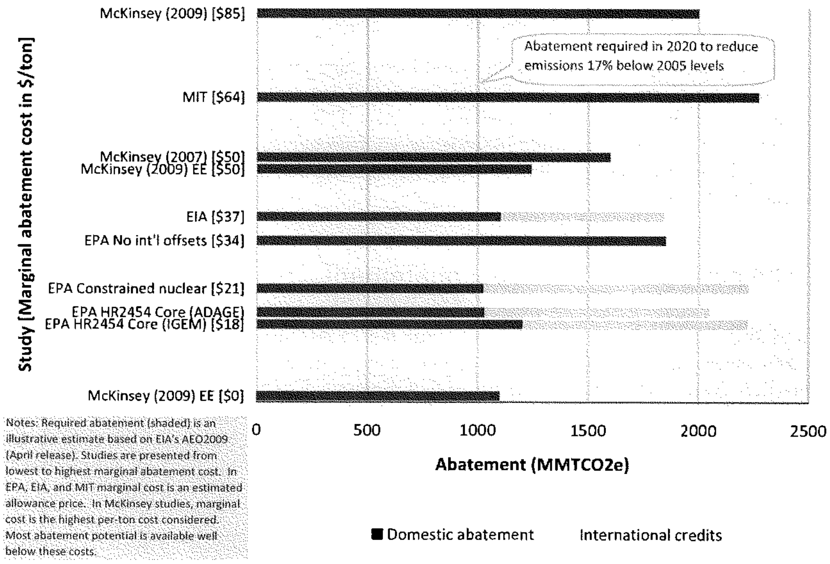
[1] Letter from Douglas W. Elmendorf, Director, Congressional Budget Office, to the Hon. David Camp (June 19, 2009).

[2] International emissions reductions that meet quality standards – i.e., reductions that are additional, measurable, and verified – would result in tradeable credits. These emissions reductions could be achieved, for example, by reducing tropical deforestation below an agreed national baseline.

Figure 1 — Estimated abatement potential in 2020, relative to that required under H.R. 2454.[3]



Notes: Required abatement (shaded) is an illustrative estimate based on EIA's AEO2009 (April release). Studies are presented from lowest to highest marginal abatement cost. In EPA, EIA, and MIT marginal cost is an estimated allowance price. In McKinsey studies, marginal cost is the highest per-ton cost considered. Most abatement potential is available well below these costs.

As Figure 1 shows, each of the EPA, EIA, MIT, and McKinsey studies shows we can achieve a 17% reduction in emissions below 2005 levels relying solely on domestic abatement. And the EPA and EIA studies show that, by using international credits (such as for reducing tropical deforestation), we can achieve much higher levels of emissions reductions, at a lower cost per ton. Note that the marginal abatement cost for the McKinsey 2009 study is the highest per-ton cost considered. Most abatement potential is available well below these costs.

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[3] Source: EDF analysis of EPA, EIA and MIT models and McKinsey studies.

1.1. Results from "top-down" analyses of U.S. climate legislation

Broadly speaking, there are two different ways of looking at the economic impact of a policy such as a carbon cap. One is a "top-down" analysis, using a macroeconomic model of the entire U.S. economy. The other is a "bottom-up analysis," which looks at the likely impact of a policy change on particular industries. I begin by describing the results of the most important top-down analyses.

EPA's Analysis of S.1733

On September 30, 2009, Senators Kerry and Boxer introduced the Clean Energy Jobs and American Power Act of 2009 (S. 1733). Last Friday, the EPA released its analysis "Economic Impacts of S. 1733: The Clean Energy Jobs and American Power Act of 2009". This analysis discusses how some of the key provisions in the Senate bill compare to the House bill, particularly with respect to the likely economic impacts of the bill. EPA based its review on nearly 50 modeling scenarios of five economy-wide climate policies performed by the Agency over the past two years, with particular focus on the two economic analyses of the Waxman-Markey bill.

EPA's assessment of the two bills indicates that the full suite of EPA models would likely show that the impacts of S. 1733 would be similar to those estimated for H.R.2454. Four key messages from the EPA analysis of H.R. 2454 would remain unchanged:

(1) the cap-and-trade policies outlined in these bills would transform the way the United States produces and uses energy;
(2) the average loss in consumption per household will be relatively low, on the order of hundreds of dollars per year in the main policy case;
(3) the impacts of climate policy are likely to vary comparatively little across geographic regions; and
(4) what we assume about the actions of other countries has much greater implications for the overall impact of the policy than the modeled differences between the two bills.

As EPA concludes that its full economic analysis would likely show similar results to those for HR2454, I discuss the HR2454 results below.

EPA's Analyses of H.R. 2454

One of the best analyses of the House legislation has been done by the Environmental Protection Agency, using two of the most widely respected and credible macroeconomic models: the ADAGE model maintained at the Research Triangle Institute, and the IGEM model run by a team at Harvard and Northeastern Universities.

The models look at emissions reductions broken down by three sources: (1) sectors that are covered by an emissions cap (electric and natural gas utilities, major manufacturers, and petroleum), (2) domestic "offsets" (activities on farms and in forests that store more carbon or reduce carbon emissions), and (3) credits for international emissions reduction (such as reducing destruction of tropical forests). Reductions are measured in metric tons of "carbon dioxide equivalent," a measuring tool that puts other greenhouse gases, such as methane and nitrous oxide, on the same scale as CO_2. (The term $MMTCO_2e$ means million metric tons of CO_2 equivalent.) All reductions are measured relative to the models' "Reference" case, which represents business as usual – that is, in the absence of any new climate legislation.

For 2020, the results of the ADAGE and IGEM models are as follows:

- Emissions reductions from sectors covered by an emissions cap: 808 million metric tons of carbon dioxide equivalent (ADAGE) and 1,028 $MMTCO_2e$ (IGEM), or an average of 918 $MMTCO_2e$;
- Emissions reductions from domestic offsets: 186 $MMTCO_2e$ (ADAGE) and 176 $MMTCO_2e$ (IGEM), or an average of 181 $MMTCO_2e$; and
- International emissions reductions, such as from reducing tropical deforestation: 1,021 $MMTCO_2e$ (IGEM).

These numbers are from the EPA's "Core" policy scenario, embodying a central set of assumptions about how the legislation will be implemented. Of course, model outcomes often depend heavily on the underlying assumptions. For that reason, EPA also runs alternative scenarios to test the sensitivity of model results. In particular, EPA analyzed a scenario in which nuclear power under climate legislation is constrained to be the same as in the reference case, and another scenario in which international credits are assumed to be completely unavailable. As Figure 1 shows, the underlying conclusion remains: even in these alternative and highly constrained scenarios, the EPA analysis identifies abundant abatement opportunities, well beyond what is required to meet the targets in the legislation.

Comparable macro studies show similarly large potential

I summarize here the results of two other top-down, macroeconomic studies of H.R.2454. Both studies echo the EPA analysis in finding the abatement potential at hand to meet 2020 targets for emission reductions – and to do so affordably. (Again, these studies are conservative in that they do not account for future technological innovation that a cap would unleash.)

The Energy Information Administration (EIA) modeled emissions reductions of about 3,537 $MMTCO_2e$ by 2020 for H.R.2454. In the Basic Case, reductions in covered emissions are projected to be smaller than the abatement from offsets. Domestic abatement accounts for 39 percent of cumulative compliance for the period 2012-2030. In particular, EIA estimates that in 2020, abatement from covered entities would be about 576 $MMTCO_2e$, offset purchases would amount to 1,252 $MMTCO_2e$. Domestic abatement would be achieved from a combination of new clean energy sources, carbon capture and storage, and energy efficiency. The vast majority of reductions in energy-related emissions are expected to occur in the electric power sector. Across the ACESA main cases, the electricity sector accounts for between 80 percent and 88 percent of the total reduction in energy-related CO_2 emissions relative to the Reference Case in 2030. Reductions in electricity-sector emissions are primarily achieved by reducing the role of conventional coal-fired generation - which in 2007 provided 50 percent of total U.S. generation - and increasing the use of no- or low-carbon generation technologies that either exist today (e.g. renewables and nuclear) or are under development (fossil with CCS). Compared to business as usual there is also a 3 percent reduction in overall energy consumption by 2020 (energy efficiency).

A modeling team at MIT also analyzed H.R.2454. MIT modeled the emission reductions for 2020 at 20 percent (the economy wide target) rather than only the 17 percent reduction target for covered sectors (which the EPA and EIA analysis of H.R.2454 modeled). MIT found that nuclear, carbon capture and storage, and biofuels are less likely to make a major contribution to abatement than they had estimated in previous studies of U.S. abatement costs. This is the result of the assumption that nuclear and CCS costs have risen substantially as plans to actually build plants have progressed. Even with the higher costs and larger reduction target, it found that the required emissions reductions could be achieved from a mix of energy efficiency (12.5 percent in 2020 compared to business as usual), renewable energy such as wind and solar (increasing its share from 8 percent to 12 percent in 2020), and some nuclear power and carbon capture and storage.[4] The MIT model shows only small increases in nuclear (from 20 percent to 22 percent) – and almost no coal with CCS use by 2020 (coal with CCS is estimated to account for only 1.5 percent of electricity generation in 2020). In other words, the MIT model achieves large near-term emissions cuts without significant reliance on CCS or new nuclear power.

A close look at the electric power sector

In the near term, a substantial fraction of domestic emissions reductions are expected to come from the electric power sector, which accounts for over one-third of total U.S. emissions (and roughly 40% of the emissions that would be covered by H.R.2454 or S.1733). A close look at projections for electricity generation provides additional insight into the modeling results – and additional confidence that we can meet the emissions targets in the legislation. While all of these models rely on the same basic building blocks – nuclear power, renewable energy, carbon capture and storage, and energy efficiency – they combine them in very different ways to get the same end result.

- The ADAGE model identifies considerable abatement potential from biomass (its share rising from 0.6% of generation in the reference case to 4% in the policy case) as well as wind and solar power (increasing from 1.8% to 2.8%). New state-of-the-art coal plants

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[4] Paltsev et al. 2009, The Cost of Climate Policy in the United States, MIT Joint Program on the Science and Policy of Global Change, report no 173, Appendix C: Cost of Climate Policy and the Waxman-Markey American Clean Energy and Security Act of 2009 (H.R. 2454.

(integrated gasification combined-cycle) equipped with carbon capture and storage are projected to come online, providing roughly 5% of power generation under the policy scenario (versus zero in the reference case). But the single biggest contribution comes from energy efficiency: the reduction in energy demand under the program amounts to roughly 10% of energy demand, or roughly twice the contribution of CCS.

- The EIA model relies somewhat more heavily on nuclear power (its share increasing from to 21% of generation in the policy scenario versus 19% in the reference case) and renewable sources (jumping from less than 15.5% to almost 20% of generation). On the other hand, energy demand does not fall by nearly as much, so that energy efficiency accounts for much less of the abatement in the sector. (CCS plays an important role by 2030, but its growth in the near term is not detailed in the EIA report.)

- MIT's model shows an increase in electricity from renewables from 9% in business as usual to 12%. The MIT model projects only small increases in nuclear power. The largest impacts come from fuel-switching and from reduced use (energy efficiency) – which account for around 12.5% in 2020.

In short, the top-down macroeconomic models take a range of approaches and employ a range of assumptions. But all of them find abundant abatement potential to meet and even exceed a near-term emissions reduction target of 17 to 20% below 2005.

Finally, I should point out what may be obvious: what models predict today is not precisely what the market will select in the future. But the models provide valuable insight into the range of market results that we can expect.

1.2. "Bottom-up" studies confirm 2020 abatement potential

The macroeconomic studies I just described take a top-down approach to modeling the U.S. economy. These studies capture broad patterns of substitution inside the economy, along with major areas of emissions reduction. They explicitly account for the interactions of markets for labor, capital, materials, and outputs. That's in many ways the right approach, but these models do not attempt to represent in detail the technologies that will actually do the job of emissions reduction. For that task, we can turn to "bottom-up" studies, which tell the story from the perspective of the businesses that will actually do the heavy lifting.

In a series of recent studies, the management consulting firm McKinsey & Company has been a leader in applying this approach to the emissions reduction potential of the U.S. economy. The message from McKinsey's work is clear, and confirms what I discussed above: we have the technologies to meet ambitious 2020 abatement targets at a very low cost. Happily, in many cases, the technologies identified by McKinsey could even provide cost *savings*.

In fact, history tells us that businesses will usually find ways to do even better than analysts predict at the outset. Adoption of a cap-and-trade system for sulfur dioxide in the 1990s, for example, meant that utilities had to come up with results – but it left up to the utilities how to achieve them. The result was to redirect R&D towards scrubbers that removed more pollution, while giving electric utilities a strong economic incentive to adopt more cost-effective scrubbers.[5] And the biggest changes spurred by cap-and-trade were process innovations that cut pollution at much lower cost than anyone had expected.[6] Thanks to all this, the cost of reducing acid rain pollution proved to be only about a third of what was projected at the time of enactment.

The same has happened as the United States has regulated a wide range of different pollutants. The details are set forth in the attached EDF fact sheet, "Air quality measures consistently cost less than predicted."

McKinsey's economy-wide analysis of costs (or savings) from moving to a low-carbon economy

In 2007, McKinsey published a survey of abatement opportunities in the United States that could be available at a cost under $50 per ton by the year 2030. The McKinsey survey catalogued 250 abatement options, grouped in 75 categories in five sectors: buildings, industry, power, transport, and agriculture, waste and forestry (as a group). In its mid-range case – which does not assume aggressive deployment of technologies or the impact of an economy-wide cap-and-trade program – McKinsey estimated that U.S. emissions could be reduced by 3,000 $MMTCO_2e$ in 2030. Much of this abatement potential is likely to be available quickly.

McKinsey estimated that half of the total abatement potential (1,500 $MMTCO_2e$) would be available with carbon prices below $10/ton, while over 60% (1,860 $MMTCO_2e$) would be available under $25/ton. Moreover, many of these low-cost technologies achieve considerable savings in energy costs once installed. As a result, we can expect to see early deployment of many of these abatement opportunities as market participants seek to reduce their exposure to the possibility of higher energy costs.

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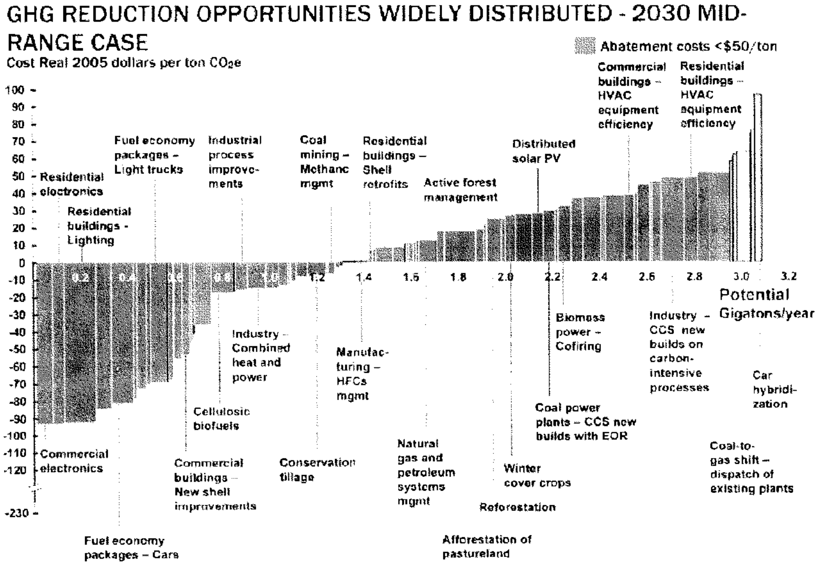
[5] David Popp, *Pollution control innovations and the Clean Air Act of 1990*, Journal of Policy Administration and Management, 22(4): 641-60 (Fall 2003); Nathaniel O. Keohane, *Environmental Policy and the Choice of Abatement Technique: Evidence from Coal-Fired Power Plants*,, working paper (2005).

[6] Dallas Burtraw, *Innovation Under the Tradable Sulfur Dioxide Emissions Permits Program in the U.S. Electricity Sector*, Resources for the Future Discussion Paper 00-38 (September 2000).



GHG REDUCTION OPPORTUNITIES WIDELY DISTRIBUTED - 2030 MID-RANGE CASE

Although the 2007 McKinsey study did not estimate the abatement opportunity that might be available in 2020, EDF derived the numbers above from McKinsey's analysis for the mid-range case, for which EDF has access to the underlying data. EDF considered each of the 75 McKinsey abatement categories individually and excluded all that do *not* represent low-cost, readily available technologies. We were left with four categories of near-term abatement opportunities: agricultural and forestry offsets; energy efficiency gains in residential and commercial buildings; fuel economy improvements in automobiles; and process changes in industrial and power sectors. These total 1,600 MMTCO$_2$e of annual abatement opportunities, available at a cost below $50 per ton. And because these opportunities appear to be low-cost, *early availability* technologies, their full annual abatement potential should be available by 2020. Excluded entirely from this total were *all* new alternative power sources, *all* industrial processes assumed to require major capital expenditures, and *all* ambiguous categories, as well as carbon capture and sequestration and expansions in nuclear power.

Earlier this year, McKinsey published a new survey of global potential for reducing emissions. In that study, McKinsey updates its estimates for total abatement opportunity in the United States. It identifies 2,000 MMTCO$_2$e of abatement potential per year by 2020 at a cost below €60/TCO$_2$e (or about $85/ton).[7] Some 1,500 MMTCO$_2$e are available at €20/TCO$_2$e ($30/ton) or below, 850 $MMTCO_2e$ are available at *zero* net cost, after accounting for savings over the lifetime of the investment. This total includes some categories left off before, such as new alternative power sources, nuclear power, and carbon capture and sequestration.

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[7] Exhibit A.V.1 of the 2009 McKinsey *report, Pathways to a low-carbon economy: version 2 of the global greenhouse gas abatement cost curve.*

The McKinsey studies find that the United States is likely to have the necessary technologies available, at low or even no cost, to meet and even exceed the *total* abatement that would be required to reduce emissions in 2020 by 17% or even more below 2005 levels. That is true even though these studies assume little innovation in the application of low-carbon technologies. Indeed, McKinsey is highly conservative: it considers only abatement opportunities either available on a commercial scale or already developed and awaiting deployment.

2. Energy efficiency

Energy efficiency has long played a critical role in economic growth. Since 1970, U.S. economic output has expanded by more than three-fold, per capita incomes are twice as large today, and yet energy and power resources have grown by only 50% over the same period.[8] California has seen even larger increases in economic output with – remarkably – no increase in per-capita electricity consumption.

Nevertheless, energy efficiency has been difficult to capture in top-down macroeconomic modeling. If we look at the historical trends, energy efficiency has often played a much larger role than originally estimated.[9] Even the most credible current models (like those in EPA models effort) may continue to underestimate the potential role of energy efficiency in achieving low-cost reductions in energy use.

McKinsey's report on energy efficiency potential

Energy efficiency is the cheapest and most often overlooked resource for reaching our emission reduction targets. In July 2009, McKinsey published a new study focused on energy efficiency potential in the United States.[10] The analysis looks *only* at investments that pay for themselves over their lifetime (so-called "NPV[Net Present Value]-positive opportunities"),[11] and only at energy savings opportunities (as opposed to improvements in generating energy). Despite these constraints, McKinsey identifies emissions reductions totaling 1,100 $MMTCO_2e$ by 2020.

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[8] Laitner, John A., *The Positive Economics of Climate Change Policies: What the Historical Evidence Can Tell Us*, American Council for an Energy-Efficiency Economy, Washington, D.C., July 2009. http://aceee.org/pubs/e095.pdf?CFID=3136298&CFTOKEN=29476767

[9] For example, a 1979 National Research Council report estimated that if the size of the U.S. economy were to double, and if energy prices adjusted for inflation remained the same, energy consumption would rise from about 72 quads in 1975 to 135 quads in 2010. The NRC model projected that if energy prices were instead to double, energy demand might grow to only 94 quads by 2010. However, in the past 35 years the economy has instead nearly tripled, and energy prices have grown on average about 70%, but total energy use is estimated to be just under 100 quads next year. In other words, energy use under an economy that has tripled in size is far below what was predicted if the economy were merely to double.

[10] The study is available at www.mckinsey.com/clientservice/electricpowernaturalgas /US_energy_efficiency.

[11] McKinsey assumes a 7% discount rate in its base case.

Happily, McKinsey reports that these energy efficiency measures pay for themselves even without any additional incentives. The savings in energy costs – $1.2 trillion in present value – exceeds their upfront cost of $520 billion. As a result, we could achieve these emissions reductions by 2020 and at the same time save $680 billion through 2020. And these calculations are based on a carbon price of *zero*. With a carbon price of $30 per ton of CO_2e, energy savings potential would increase by 8%, while at $50 per ton it would grow by 13%. With these carbon prices, the energy efficiency measures described in the McKinsey study would result in emissions reductions by 2020 of 1,188 $MMTCO_2$ (at $30/ton) and 1,243 $MMTCO_2e$ (at $50/ton).

To be sure, there are obstacles that interfere with capturing all of these savings For example, home builders typically try to minimize their upfront costs, which may mean skimping on technology (such as highly efficient HVAC equipment) that costs a bit more but would save buyers large amounts of money over time. Similarly, owners of commercial builders may be on the hook to pay for capital upgrades (sucb as more efficient lighting) while tenants pay the utility bills (and thus would enjoy the resulting savings). In addition, some energy efficiency opportunities must overcome engrained habits – or require people to make changes in behavior that they may resist. To overcome those obstacles, McKinsey argues for a comprehensive, holistic approach combining purely market-based approaches – such as putting a cap on carbon – with standards, education campaigns, innovative financing instruments, and other measures.

Analysis by Synapse Energy Economics

A May 2009 analysis by Synapse Energy Economics Inc. (and commissioned by EDF) confirms many of these energy-efficiency results. The Synapse study shows that the emissions reduction targets in H.R. 2454 could be cost-effectively achieved – and even surpassed – through proven energy-efficiency measures and modest implementation of agriculture and forestry offsets. For example, Synapse found that implementing policies to achieve 2% annual, cumulative savings from energy efficiency would result in avoidance of 1,120 $MMTCO_2e$ annually by 2030. This represents a 40% reduction below 2010 greenhouse gas emission levels for the electricity sector, and can be achieved very cost-effectively. The average cost of electric utility efficiency programs is often only about 3 to 4 cents per kilowatt-hour, compared to the national average electricity price of 9 cents per kilowatt hour. In other words, it can be much cheaper to avoid using energy than to generate more of it.

Energy Efficiency Opportunities Across Key Industries

With today's technology, many opportunities exist for energy-intensive businesses like chemicals and cement to cut energy use and improve productivity, offsetting rising energy price. With energy prices likely to fluctuate in the future, energy efficiency provides a good strategy for reducing risks from higher energy prices – whether under a cap or not.

While many energy efficiency solutions exist, constraints such as lack of capital and return on investments below 10% prevented adoption historically. But, a cap on carbon changes the landscape in several important ways: first, a cap will improve the ROI, making it feasible to fund more energy efficiency projects; second, with a cap driving the need to reduce carbon across the economy, providers of energy efficiency solutions can reach the scale necessary to reduce their costs, also improving the ROI; and, lastly, the large volume of customers created by a cap can attract private, third party financing and other creative financing mechanisms to assist in finding necessary capital investments.

For example, according to a new landmark study by McKinsey and Company, 16% of the chemical sector's global greenhouse gas footprint can be abated using existing technologies at a marginal cost of less than zero. A carbon cap will drive companies to capture these net-profit-positive efficiency solutions.[12] Examples of some opportunities include: on-site energy management and monitoring, efficient motor systems, waste heat recycling, ethylene-cracking improvement, catalyst optimization, use of lower operating temperature reactions, and use of membranes in place of distillation separation.

The story is similar in the cement industry – the same McKinsey study shows potential for reducing 18% percent of the cement sector's global greenhouse gas footprint using existing technologies at a marginal cost of less than zero. Examples of opportunities include similar strategies such as on-site energy management and monitoring, capturing waste heat, efficient motor systems, but also industry specific opportunities such as replacing energy-intensive "clinker" in cement with alternatives like fly ash and other minerals and grate cooler conversion and optimization. In the Department of Energy's *Pulp and Paper Industry Energy Bandwidth Study Report,* the findings showed that state-of-the-art mills consumed 26% less energy than average mills and implementation of advanced technologies could reduce mill energy consumption by 41%. State-of-the-art mills consumed 46% less fossil fuel than average mills and advanced technologies could reduce fossil fuel consumption by 75%.[13]

Evidence from the Ground

To date, *less than 15%* of large U.S. industrial plants have participated in DOE's Save Energy Now program to improve their energy performance. Even for the plants that have participated, considerable opportunity still exists to implement low-cost energy efficiency solutions. Table 1 provides an overview of the opportunities identified and the portion of project savings already realized – but also indicates a large percentage of these opportunities not yet implemented and savings still available. Furthermore, on average, two-thirds of the projects identified by DOE had payback periods of two years or less.

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[12] McKinsey & Company, *Pathways to a Low Carbon Economy, Version 2.0*, January 2009.

[13] http://www1.eere.energy.gov/industry/forest/bandwidth.html

TABLE 1: Results of DOE Save Energy Now Program

	Iron & Steel	Cement	Chemicals	Refineries
Participating U.S. Plants	62	16	100	22
Total Potential Annual Energy Cost Savings Identified (mil)	$233.3	$14.0	$218.3	$53.5
Total Energy Cost Savings Implemented (mil)	$31.1	$0.3	$57.4	$6.1
Dollars Remaining (mil)	**$202.2**	**$13.7**	**$160.9**	**$47.4**
Opportunities with Payback of 2 years or less	72%	71%	74%	74%

Source: DOE, Save Energy Now, as of 2/1/2009.

An efficiency project at the Mittal Steel plant in East Chicago, IN exemplifies the energy-saving opportunities available to the broader steel industry. At this plant, a 95-MW Combined Heat and Power system was installed to capture waste heat and turn it into electricity. That system now provides 25% of the plant's electrical requirements and 85% of its processed steam needs, cutting carbon emissions by 1.3 million tons a year and saving more than $100 million.[14] In fact, waste heat recovery is such an attractive solution for industries from steel and flat glass manufacturing to refineries and paper mills that Dedham Capital Management is providing capital to Recycled Energy Development Corporation to finance projects at industrial facilities – making such solutions an easy win for industrial facilities.

While energy efficiency reduces risks and helps avoid job loss, all clean energy strategies – whether energy efficiency, renewables, or other innovative low carbon solutions – provide significant job creation. I will now turn to the growing evidence on the ground that the clean energy sector can be an engine of economic growth.

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[14] Oak Ridge National Lab, Combined Heat and Power: Effective Energy Solutions for a Sustainable Future, 2008; The Atlantic Monthly, Waste Not, May 2008.

3. Potential for job creation in the clean energy sector

In its pioneering study, *Manufacturing Climate Solutions*, Duke University's Center on Globalization, Governance & Competitiveness has analyzed a variety of low-carbon technologies to look at the business and job opportunities they will create.[15] The Duke team examines the value chain behind these technologies, and finds they will create a wide range of new jobs, from mining of raw materials, to manufacturing of components, to finished product manufacturing, and finally to installation and (in some cases) monitoring. To date, the Duke team has examined 12 low-carbon technologies, eight of which are in energy saving technologies: LED lighting, high performance windows, anti-idling truck technology, electric heat pump water heaters, industrial waste heat recovery systems, hybrid drivetrains for trucks, insulation, and public transit buses. (In addition, the study details supply chains for concentrated solar power, Super Soil systems for methane capture, carbon capture and storage, and wind power.)

In each case, a single low-carbon solution generates a complex web of economic activity – and of American jobs. Just an illustrative list of component manufacturers in the supply chain for electric heat pump water heaters counts 43 companies in 19 states. Thirteen component manufacturers in six states in the supply chain for high-performance windows alone have over 100,000 employees; and this does not yet count other portions of the supply chain from raw materials such as aluminum, vinyl and lumber to window manufacturers, wholesalers, retailers and contractors. On the whole, the eight energy efficiency supply chains account for hundreds of thousands of jobs all across the United States. Projected conservatively, looking at all the technologies for all the states, there are tens of thousands of small businesses poised to benefit from a cap on carbon.

3.1. Case Study: CCS is "Ready to Roll"

The successful deployment of carbon capture and storage solutions, including geologic sequestration, is a critical path for adapting coal, the world's most abundant but carbon-intensive fossil fuel, to a carbon-constrained future. According to an IEA study released in 2006, CCS could rank, by 2050, second only to energy efficiency as a way of cutting greenhouse gas emissions. The Intergovernmental Panel on Climate Change (IPCC) projects that CCS could, by 2100, contribute 15 to 55% of the greenhouse gas reductions needed to avert catastrophic climate change.

As a technical matter, CCS is ready to begin deployment today. In fact, Gardiner Hill, BP's Director of CCS Technology, calls it "ready to roll." Four full-scale CCS projects exist today – one of which, the Sleipner project in Norway, has been in operation since 1996.[16] The Department of Energy recently announced that projects by Basin Electric Power Cooperative in

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[15] http://www.cggc.duke.edu/environment/climatesolutions/

[16] The other CCS projects are the In Salah project in Algeria, the Snohvit project in Norway, and the Weyburn projects in Wyoming and Canada.

North Dakota and Hydrogen Energy International in California have been selected for up to $408 million in funding from the American Recovery and Reinvestment Act for advanced technologies to reduce CO2 emissions. One project is for an existing power plant, while the other is for a new facility. Many other large-scale CCS projects are also pending in the U.S. and around the world.[17]

To achieve greater deployment, what is really needed is a market driver and a clear regulatory framework for the technology. CCS is currently expensive, and to reduce costs we need more experience at integrating the various technologies at large scale. But these are just more reasons to adopt a carbon cap now – to prompt more investment and advance the technology. A recent Harvard study says that "the cost premiums for generating low carbon electricity with CCS are found to be broadly similar to the cost premiums for generating low carbon electricity by other means." The study also suggests that costs are likely to drop 65% by 2030.[18]

On the storage side, geologic sequestration of carbon dioxide is clearly feasible under the right conditions. It has been successfully demonstrated in a number of field projects, including several large projects. The IPCC Special Report on Carbon Capture and Storage concluded in 2005 that the fraction of CO2 retained in "appropriately selected and managed geological reservoirs" is likely to exceed 99% over 1000 years. Although determining the suitability of a particular site requires extensive homework (such as geologic characterization) about specific sites, it is clear that the total storage capacity is huge. The IPCC estimates there is enough capacity worldwide to permanently sequester 1,100 gigatons of CO2. (For comparison, global emissions from large stationary sources are approximately 13 gigatons per year.)[19] A preliminary estimate in the Department of Energy's Carbon Sequestration Atlas suggests that storage capacity in the U.S. and Canada might handle 1,100 years of emissions from stationary sources.

The IPCC also concluded that the local health, safety, and environmental risks of CCS are comparable to the risk of current activities such as natural gas storage, enhanced oil recovery, and deep underground storage of acid gas if there is "appropriate site selection based on available subsurface information, a monitoring program to detect problems, a regulatory system and the appropriate use of remediation methods to stop or control CO2 releases if they arise." (Enhanced oil recovery involves pumping a gas (such as carbon dioxide) underground to make it easier to extract oil.) The IPCC and others also find that the risk of leakage will tend to decrease with time.

On the regulatory front, EPA is on track to adopt rules about geologic sequestration within the next few months. And many states are currently writing their own rules as well.

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[17] A recent International Energy Agency study includes a survey of existing and planned projects. IEA, *CO_2 Capture and Storage: A Key Carbon Abatement Option* (2008).

[18] http://belfercenter.ksg.harvard.edu/files/2009_AlJuaied_Whitmore_Realistic_Costs_of_Carbon_Capture_web.pdf

[19] IPCC Special Report on Carbon Dioxide Capture and Storage (2005).

3.2. CCS: a jobs engine

As described above, capturing and storing carbon dioxide would enable continued use of fossil fuel combustion for power generation and industry use while limiting the release of CO2 into the atmosphere. But deployment of CCS technology at large scale will do more: it will spur development of an entire new industry, with a large and robust supply chain.

There are three general processes for CO2 capture: pre-combustion, post-combustion, and oxy-fuel capture. These processes separate and condense CO2 so it can be transferred in liquid form to a long-term storage location.

I commend to you the latest chapter of the Manufacturing Climate Solutions report by Duke University.[20] That report illustrates the economic potential of CCS by detailing the value chains for one particular technology – the chilled ammonia capture process. This chart – a simplified value chain for this technology– will give you the idea:

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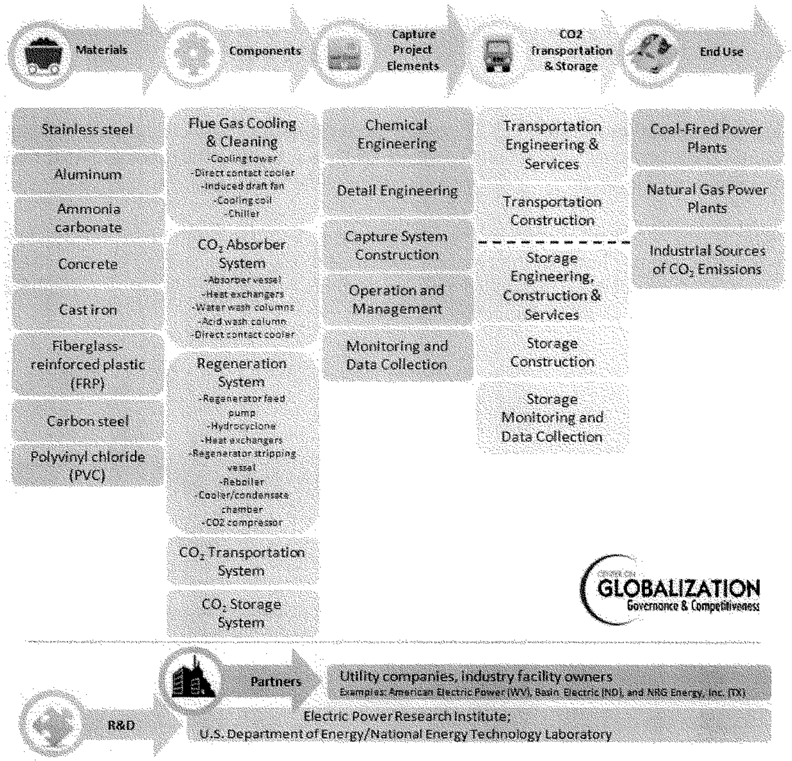
[20] The complete report is available at www.cggc.duke.edu/environment/climatesolutions/

Simplified Value Chain for a CO2 Capture Technology:
The Chilled Ammonia Process


Materials
Components
Capture Project Elements
CO2 Transportation & Storage
End Use
Stainless steel
Aluminum
Ammonia carbonate
Concrete
Cast iron
Fiberglass-reinforced plastic (FRP)
Carbon steel
Polyvinyl chloride (PVC)
Flue Gas Cooling & Cleaning
-Cooling tower
-Direct contact cooler
-Induced draft fan
-Cooling coil
-Chiller
CO₂ Absorber System
-Absorber vessel
-Heat exchangers
-Water wash columns
-Acid wash column
-Direct contact cooler
Regeneration System
-Regenerator feed pump
-Hydrocyclone
-Heat exchangers
-Regenerator stripping vessel
-Reboiler
-Cooler/condensate chamber
-CO2 compressor
CO₂ Transportation System
CO₂ Storage System
Chemical Engineering
Detail Engineering
Capture System Construction
Operation and Management
Monitoring and Data Collection
Transportation Engineering & Services
Transportation Construction
Storage Engineering, Construction & Services
Storage Construction
Storage Monitoring and Data Collection
Coal-Fired Power Plants
Natural Gas Power Plants
Industrial Sources of CO₂ Emissions
GLOBALIZATION
Governance & Competitiveness
Partners
Utility companies, industry facility owners
Examples: American Electric Power (WV), Basin Electric (ND), and NRG Energy, Inc. (TX)
R&D
Electric Power Research Institute;
U.S. Department of Energy/National Energy Technology Laboratory

Note that the value chain includes raw materials (which need to be mined or collected), component parts (which need to be manufactured), processes (which need to be engineered), and transportation and storage (which require a variety of service workers). Each of these points along the value chain is an opportunity to create jobs for skilled workers such as steel workers, manufacturing technicians, welders, pipefitters, chemical and civil engineers, and construction workers. Looking just at construction, Alstom estimates that building a chilled ammonia process facility for a 600 MW power plant would take three years and require 2,000 construction jobs. And Powerspan officials estimate that a CCS facility for a 100 MW power plant would take between three and four years to construct and create up to 500 jobs at its peak.[21]

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[21] Procopis, 2009.

These jobs would be created all over the country. And these examples are for just one part of the value chain for just one of the three types of capture technologies. Each way of capturing carbon will have its own value chain of materials, components, project elements, transportation and storage, and end use.

The Duke researchers have shown the same thing for 10 other low-carbon technologies. It turns out, for example, that American manufacturers are world leaders in making energy-efficient windows – and that those manufacturers, in turn, rely on a long American supply chain of component manufacturers and providers of raw materials. The Duke research shows the same story again and again, for technologies as diverse as LED lighting and methane capture from animal wastes.

4. The clean energy economy – poised to grow

Earlier this year, EDF launched LessCarbonMoreJobs.org, a new online resource to identify green jobs around the country. To date, we have mapped companies in 22 states that are all poised to grow and create new jobs under a federal cap on carbon emissions, making it the first comprehensive source of information on America's rapidly expanding green economy. The map of Pennslyvania included here provides a sample of this data source.[22]

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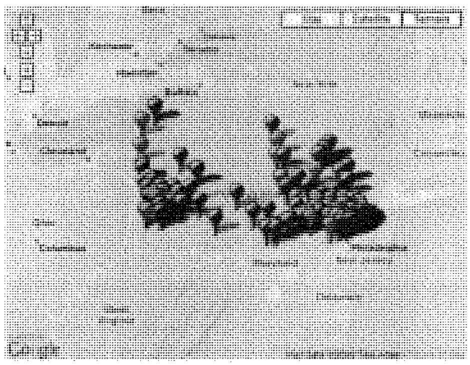
[22] See www.LessCarbonMoreJobs.org for maps of additional states.

LessCarbonMoreJobs.org



An online resource linking you to the "green"businesses in your own backyard

EDF commissioned the widely respected market research firm, Frost & Sullivan, to conduct two surveys of the businesses in the new energy economy identified in our lesscarbonmorejobs.org maps to provide a snapshot of economic activity. The first survey in December of 2009 showed that 42% of respondents had seen a growth in sales during the past two years; another 42% had seen no change in sales while only 16% had seen a decrease in sales.[23] In August of 2009, in the second round of the survey, the results were even stronger: 55% of respondents said their sales have increased over the past one to two years; 30% have had sales stay the same, and only 14% has seen a decrease. While a good portion of that increase can be linked to federal stimulus spending, the results show that even in the recession, this sector is poised to grow and create jobs – in fact, 25% of the firms with growing sales surveyed in August 2009 are planning to hire new staff, even in today's uncertain economic climate.

A cap on carbon can amplify the stimulus and catalyze strong economic growth in this sector. Data from California show a direct benefit of a cap on investments and number of new companies. In 2002-2004 when the CA renewable portfolio standard was introduced, the investments and number of companies in the cleantech sector grew at a compund annual rate of 20%. But during the period of 2005 - 2008, after AB32 and a cap on carbon was introduced and passed, that growth rate jumped to 98%.[24]

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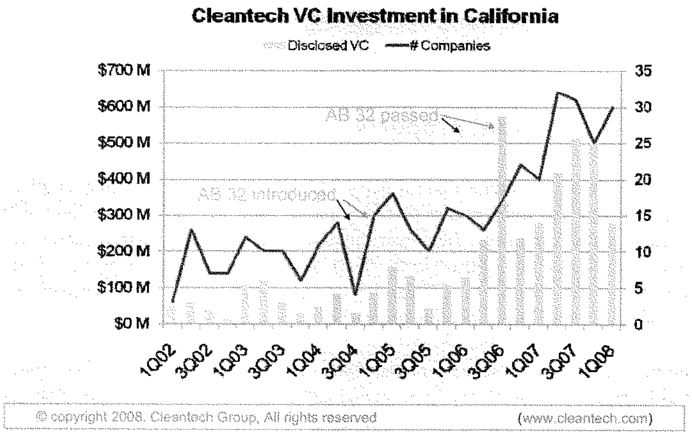
[23] Frost & Sullivan, "New Energy Economy Market Research Study," and "New Energy Economy Market Research Study: Wave II," available at www.LessCarbonMoreJobs.org.

[24] CleanTech Group, data prepared for EDF and available at www.lesscarbonmorejobs.org.



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4.1 Jobs & U.S. role in emerging clean energy markets

Many experts are trying to assess the potential size of the new clean energy market. We know it will be enormous. We also know there will be new innovations and new markets we can't conceive of today. New Energy Finance, which tracks investments in the clean energy market, notes that we are currently investing globally around $115 billion per year in clean energy. To achieve peak emissions of greenhouse gases in 2020 will demand significantly more investment and create a global market for $500 billion in clean energy annually – a new market that is *two and a half times* the size of the $200 billion global PC market.[25] McKinsey estimates that the required incremental clean capital investment in China alone will be $200-250 billion per year over the next 20 years.[26] Other markets, India in particular, could see similarly large increases in demand for clean technologies.

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[25] New Energy Finance Summit Book 2009. The "clean energy market" covers 17 sectors including renewables, energy efficiency, smart grid, more efficient transportation solutions, and support services (such as New Energy Finance itself). For a full definition of clean energy market, see p. 22, "New Energy Finance, Clean Energy League Tables 2008," Both publications here available at http://www.newenergyfinance.com/free-publications/white-papers/

[26] http://www.mckinsey.com/locations/greaterchina/mckonchina/reports/china_green_revolution_report.pdf

The number of U.S. jobs that come with these vast new markets depends entirely on how much market share we win. Key to winning market share is developing the intellectual property and then delivering market demand and customers. Companies often locate near new customers, making customers critical to commercializing new technologies. In the U.S. we do one but not the other.

4.2 U.S. leads in intellectual property

The U.S. has been a clear leader in intellectual property related to clean energy. For example, the Clean Energy Patent Growth Index shows that U.S. patent owners and inventors held 50% of all patents granted in the Clean Energy field over the period 2002-2008. Japan was second with 29% of patents filed, and Germany third with 9%. (California, Michigan, New York and Connecticut lead the other U.S. states in the Clean Energy area with the first three garnering twenty five percent of the Clean Energy patents granted to U.S. assignees since 2002.)[27]

Yet, our leadership in intellectual property is not translating into leadership in manufacturing, job creation or wealth creation. In 2001, the U.S. owned 28% of market share for photovoltaics while China owned only 1%. By 2008, the market share had flipped – the U.S. held only 6% while China grew to 29%. The U.S. did have a compound annual growth rate in manufacture of PV solar cells of 31% between 2004 and 2008, BUT China's compound annual growth rate for solar cells for that same period was 131%. The average global growth rate was 53%, so the U.S. is clearly lagging.[28] The same is true for wind where the U.S. historically led the industry, but today only GE still is a major manufacturer with 18% market share in 2008, behind manufacturers in Denmark, Germany, and Spain.[29] Batteries – crucial for the next generation of cars and for renewables storage – is another area where the U.S. needs to make up ground. The White House announced in August 2009 investments of $2.4 billion in recovery funds for advanced battery and electric vehicles.[30]

For all of these new markets, a cap will create customers. A cap will spur on commercialization, help the U.S. gain market share, and ultimately result in new jobs.

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[27] http://cepgi.typepad.com/heslin_rothenberg_farley_/

[28] Prometheus Institute & Greentech Media, "PV News," Vol 28, No. 4, April 2009.

[29] American Wind Energy Association and http://www.ecoseed.org/index.php/general-news/green-business/green-business-news/833-global-market-share-in-wind-turbine-manufacturers-unveiled#

[30] http://www.whitehouse.gov/the_press_office/Obama-Administration-Officials-Travel-America-Talk-Clean-Energy-Economy/

5. Conclusion

I've summarized the results of many different economic studies. All show we can reach ambitious emissions reduction targets by 2020 with known technology at an affordable cost. In fact, although H.R. 2454 calls for a 17% reduction target, the economic evidence I've discussed here shows that a 20% reduction, as proposed in S.1733 is easily within reach.

But reducing emissions is only half the story.

We will also see tremendous innovation. At the turn of the last century, the largest environmental problem facing large cities such as New York was horse manure. Tens of thousands of horses produced more than 1,000 tons of manure each day. That meant that hundreds of horses were needed just to haul the manure away, not to mention the land necessary to house and feed the horse population. The fight between food and fuel was very real even then, and the model of cities looked unsustainable. We know, of course, what came next: the combination of Henry Ford and John D. Rockefeller saved the day, and oil-powered cars replaced horses as the main means of transport in New York and across the United States.

Fast forward 100 years, and we face a new problem: weaning ourselves off of oil. We know that the tools are already out there to do so – we just need to use them. We also know that markets have proven time and time again that they are the most powerful way to unleash that innovative potential and make the impossible possible. Cap-and-trade with ambitious emissions reduction targets establishes such a market and enables us to use the power of markets as an unambiguous force for good.

What's driven progress in the U.S. economy is technological innovation – in the context, of course, of a market economy that has provided incentives for that innovation. We've led the way in the major economic transitions of the past century: wide-scale mass production; the development of semiconductors; the space age; the Internet age. The smashing success of semiconductors illustrates the central importance of technology to U.S. economic growth. From the invention of the transistor in 1948, to the development of integrated circuits in the 1950s and 1960s, to the emergence of microchips in the 1990s – at every stage, the United States has led the world, and our leadership in this area has led to our phenomenal postwar growth.

For the upcoming decade, clean energy can play the same role in the U.S. economy that building a powerful military machine to win World War II did in the 1940s – and that the computer revolution did in the 1990s. Putting a ceiling on carbon emissions will inspire American innovation that will position the United States competitively for growth in the worldwide transition to a low-carbon economy. Though Europe and Japan have already started down this road, we will start before China, India and other emerging economies. But eventually all countries will join the international system to limit carbon emissions.

The nations that lead the hunt for low-carbon technologies will find that a huge market awaits them. Will we develop and export the coming wave of low carbon technologies – like carbon capture and sequestration, next-generation solar panels, and powerful lightweight batteries – so that jobs and businesses stay in America? Or will we sit back and wait, only to find ourselves importing those technologies from overseas?

In my view, it's not a difficult choice: let's harness American ingenuity now to rebuild our economy and protect the planet at the same time.

APPENDIX

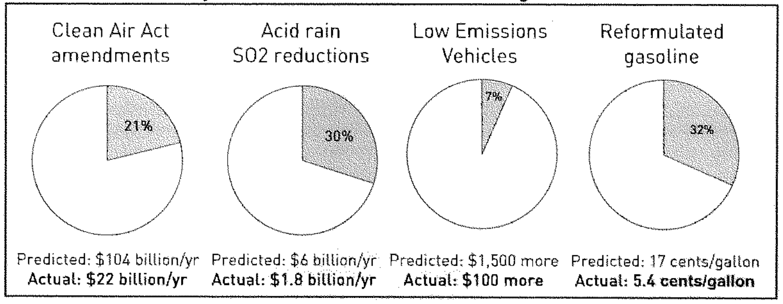
Air quality measures consistently cost less than predicted

In December 1970, the Clean Air Act became law. A triumph of bipartisanship, the statute has delivered cleaner, healthier air to millions of Americans. It has also proved to be one of the most cost-effective regulatory programs in American history. The U.S. Environmental Protection Agency (EPA) valued the total health benefits through 1990 at $22.2 trillion and the total compliance costs over the same years at $0.5 trillion, resulting in net monetary benefits of $21.7 trillion. The Clean Air Act continues to deliver these benefits, supplemented by the considerable health and environmental gains from the Clean Air Act Amendments of 1990.

Dire predictions and cost-effective results

Each time EPA has considered new clean air standards, it has been challenged with claims that meeting the new standards would not be feasible, practical or affordable. Yet time after time, the reverse has proved true. Benefits have overwhelmed the costs, which have been consistently lower than predicted. (See the figure below and the table on the reverse side).

Actual vs. Projected Costs of Air Pollution Regulation in the U.S.



The cost of cleaning America's air has been consistently lower than projected. This figure shows the actual cost of air pollution regulation as a percentage of initial predicted costs.

Cap-and-trade is the best approach to reducing emissions

One of the most innovative aspects of the Clean Air Act is its cap-and-trade approach to reducing emissions of sulfur dioxide, a precursor to acid rain. Initial analyses of the program warned of high costs, but these fears were not realized. In fact, the program demonstrates that properly designed market-based approaches can reduce emissions ahead of schedule and at far lower cost than conventional command-and-control regulation. The cap-and-trade approach provides incentives to reduce emissions, leads to low-cost environmental results and turns pollution reductions into marketable assets. Since its inception, the program has achieved 100% compliance in Phase I, reduced emissions at least 35% below 1990 levels and cost far less than projected.

Comparison of predicted costs of clean air programs with actual costs

Program	Predicted costs	Actual costs
Clean Air Act (CAA) amendments	**1990:** "The study we are releasing today estimates that the cost of the various proposed amendments . . . could be as high as **$104 billion** per year."[a]	**1995:** Five years after implementation, EPA estimated that the CAA amendments cost **$22 billion** per year.[b]
Acid rain	**1990:** The EPA estimated that Phase II costs would be **$6 billion** per year.[c] **1990:** The Edison Electric Institute estimated that SO2 reductions would cost the electric utility industry **$3.6–4.5 billion** per year.[e]	**2005:** The Office of Management and Budget estimated that the annual cost of reducing SO2 is **$1.1–1.8 billion.**[d]
Low emissions vehicles	**1994:** Automobile manufacturers estimated that low emission vehicles would cost **$1,500** more than comparable car models.[f] **1990:** The California Air Resources Board estimated the average incremental cost of a low emissions vehicle to be **$170**. Industry estimates in California were **$788**.[h]	**1995:** One year after this estimate, Honda placed a Civic subcompact model on the market that emitted less than half of what was permitted under California law. This vehicle cost only **$100** more than comparable models.[g] **1998:** The actual incremental cost of low emission vehicle technology was **$83**.[i]
Reformulated gasoline in California	**1991:** The California Air Resources Board predicted that reformulated gas would lead to a price increase of **12–17 cents** per gallon.[j]	**1998:** The actual price differential was **5.4 cents** per gallon.[k]

a Business Roundtable. "Clean Air Act Legislation Cost Evaluation." January 18, 1990.

b E.H. Pechan & Associates, Inc., contracted by EPA. "Clean Air Act Section 812 Prospective Assessment—Cost Analysis Draft Report". September, 1995.

c National Acid Precipitation Assessment Program. 'Report to Congress: An Integrated Assessment." 2005. Available at: http://www.al.noaa.gov/AQRS/reports/napapreport05.pdf.

d Ibid.

e Materials sent to editors and writers by the Edison Electric Institute describing the impact of the Clean Air Act Amendments on the electric utility industry. December 17, 1990.

f Sierra Research, Inc., "The Cost Effectiveness of Further Regulating Mobile Source Emissions." February 28, 1994.

g *The New York Times*, "Honda Meets a Strict Emission Rule." August 30, 1995.

h W. Harrington, R. Morgenstern, P. Nelson (Resources for the Future), "On the Accuracy of Regulatory Cost Estimates." January 1999. Citing Cackett,"The Cost of Emission Controls on Motor Vehicles and Fuels: Two Case Studies," presented at the 1998 Summer Symposium of the EPA Center on Airborne Organics, MIT Endicott House, Dedham, Mass. July 9–10, 1998.

i Ibid.

j Ibid.

k Ibid.

Senator BOXER. Thank you very much, Mr. Krupp.

Our next two witnesses, we welcome them. They were invited by the minority. Mike Carey, President of the Ohio Coal Association, a trade association that represents stakeholders involved in Ohio's underground and surface coal mining production. I don't know if Senator Voinovich wanted to introduce you, but let me assure you that you are welcomed here, and please proceed.

Senator Voinovich, would you like to give a further introduction to Mr. Carey?

He doesn't want to give you and introduction, so we welcome you and please go right ahead.

STATEMENT OF MIKE CAREY, PRESIDENT, OHIO COAL ASSOCIATION

Mr. CAREY. Madam Chairman, Ranking Member Inhofe, members of the committee, my name is Mike Carey. I am President of the Ohio Coal Association. I also serve as the Technical Vice Chairman of the Ohio Coal Development Technical Office, and I sit on the National Coal Council, though I am not speaking on their behalf today.

I want to thank you for inviting me for the opportunity to speak. The points I will make are presented in greater detail in my written testimony.

I represent the coal industry, its companies, its workers, as well as the communities across Appalachia that depend on coal for their livelihoods. According to the Pennsylvania State University, each coal miner supports up to 11 jobs in their community, from truckers to mechanics to railroad employees to small business owners.

These coal miners in Ohio average about $64,000 a year in income. That is $25,000 higher than our State's average. These high paying jobs fuel our local economies, our police forces, and our public works projects. We believe that the Kerry-Boxer bill will kill our jobs, devastate our communities, and bankrupt our region, and consequently threaten the rest of this Nation.

Coal supplies 52 percent of America's electricity. It is our most abundant and least expensive domestic energy resource. No one can predict the potential energy and economic disruptions that will ensue when you take coal off the table in such a rapid and drastic fashion.

We are told not to worry. The green jobs are on the way to rescue us. But a recent study of green jobs from scholars at four universities have included that they tend to be low paying, clerical, bureaucratic, administrative positions that do not produce economy enhancing goods or services.

Let me tell you what a coal mining job does. It provides a steady above average wage, benefits, a sense of community, as mines last many decades in their regions. While we applaud the efforts of this legislation to include provisions that aid the future and transition of coal, in a carbon constrained economy, the bottom line is that this bill does kill the coal industry.

Bill proponents tout carbon capture and storage as coal's future. However, simply throwing billions of dollars at CCS does not ensure that the technology will be available prior to 2020 or 2030. And according to this bill, it is the sense of the Senate that the

CCS needs to be fully developed by 2030. Unfortunately, that comes 18 years too late since the reductions begin by 2012, so utilities will have already begun to fuel switch.

CCS technology is still in its infancy and has not been commercially deployed. Importantly, this bill does not roll back the emission caps if CCS does not work.

Furthermore, I am not here to argue the science of coal CO_2 emissions, but I would like to point out that this bill ignores two other sciences: math and economics. Shutting down the entire U.S. coal industry for 100 years only changes the CO_2 atmospheric levels by 3 percent, which is roughly the same difference between today and CO_2 levels of 5 or 6 years ago, according to the U.S. EPA.

In response to a question from Senator Inhofe at an earlier Senate hearing, EPA Administrator Lisa Jackson admitted that curbing U.S. CO_2 emissions would have no significant impact on atmospheric CO_2 levels. Moreover, Kerry-Boxer doesn't require the developing countries like China, India, Mexico to do anything to curb their CO_2.

So as U.S. companies continue to outsource their jobs to the developing world and avoid expensive emission caps, they will also outsource their emissions. Therefore, Kerry-Boxer would not reduce emissions as much as it would merely displace them.

Even NASA's Jim Hansen, perhaps the most outspoken of those concerned about CO_2, labeled the Waxman-Markey bill a "counterfeit climate bill." And he said, "It is no more fit to rescue our climate than a V–2 rocket was to land a man on the moon."

An analysis of the EPA prepared for Senator Feingold, for example, shows that California would receive a windfall at the expense of Midwestern States like Wisconsin and that of my own Ohio.

Finally, we urge this committee to acknowledge that the threat of the looming EPA regulation of CO_2 is a canard. EPA CO_2 regulation is an optional policy decision being driven solely by the Administration. The Supreme Court only ruled in Massachusetts v. EPA that the EPA may regulate carbon dioxide. It did not rule that it must, and the Administration can decide not to act. If Congress is truly frightened about the prospect of the EPA regulating CO_2, then it should simply amend the Clean Air Act to prohibit it.

Finally, what sorts of energy and environmental policy should Congress explore instead of cap and trade? We believe to promote all forms of domestic energy, encourage energy efficiency, avoid policies that favor one over another, reduce energy costs to the consumers, and protect existing jobs.

Madam Chairman, I thank you for the opportunity to speak, and I look forward to the questions.

[The prepared statement of Mr. Carey follows:]

Testimony of Mike Carey
President, Ohio Coal Association
Panel 1: Moving to a Clean Energy Economy
Senate Committee on Environment & Public Works
Thursday, October 29, 2009

Madame Chairman, Ranking Member Inhofe, and members of the Committee, my name is Mike Carey and I am the President of the Ohio Coal Association. Thank you for the invitation to speak today on such an important and vital topic, the issue of jobs under a Cap and Trade Regime.

In my position with the Coal Association, I not only represent the coal industry, its companies and workers, but also our friends and neighbors in the Appalachian coal communities who depend upon the coal industry for their community's livelihood. According to The Pennsylvania State University, every coal worker supports up to eleven other jobs in their community, from shop keepers and barbers to restaurant workers to railroad employees[1]. The same study showed that every $1 billion in U.S. coal production stimulates a total production of $3.138 billion of production throughout the economy. This means that every dollar of net coal industry production translates into $3.14 of economy-wide output.

Coal workers in Ohio make on average just over $64,000[2], which is approximately $25,000 more than the State average yearly income[3]. So these high paying jobs not only fuel our nation's energy, but also our community's economy and the economy of the entire region.

Recently, the Institute for 21st Century Energy took EIA modeling methods for the Waxman-Markey legislation and updated them to include more realistic assumptions, determining that the EIA's economic analysis was grossly underreported. According to their models, Waxman-Markey will reduce cumulative economic growth by $1.6 trillion from 2012 through 2030, nearly 45% greater than the EIA's analysis. While EIA estimates that Waxman-Markey reduces household personal consumption expenditures by $220, the Institute believes that this number is in fact $630. Finally, the Waxman-Markey bill will cost the American economy 1 million jobs in 2030, of which 440,000 come from the coal-dependent manufacturing sector.

Without a doubt, this legislation which the Committee is considering will devastate our communities, bankrupt our region, cause energy costs to soar across the country, and according to the EPA have almost no impact on global temperatures since China, India and the rest of the developing world will continue to increase their emissions.

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[1] Rose, Adam and Oscar Frias. *The Impact of Coal on the U.S. Economy.* Pennsylvania State University, April 1994 *Updated in July 2006 as, "The Economic Impacts of Coal Utilization and Displacement in the Continental United States, 2015"

[2] According to the National Mining Association. The average Ohio coal miner earns $64,479 http://www.nma.org/pdf/c_wages_state_industries.pdf. By contrast, the Bureau of Labor Statistics estimates that each nonsupervisory coal miner makes $56,836. However, this does not include shift managers and is a nation-wide estimate. http://www.bls.gov/oco/cg/cgs004.htm

[3] According to the Bureau of Labor Statistics' May 2008 Ohio State Occupational Employment and Wage Estimates report: http://www.bls.gov/oes/2008/may/oes_oh.htm#b47-0000

Today I would like to discuss four key points:

1) The promise of a green job economy is a myth, particularly in the coal regions of our country,

2) The impacts of this legislation vary dramatically from Region to Region, with major losers and very few people who might win,

3) The legislation will devastate coal communities, as nothing in this Bill will protect coal workers or allow our country to continue to use our most abundant and cheapest form of domestic energy, coal; and

4) The threat that Congress must act in order to stop EPA is a canard and nothing in this Bill stops EPA from acting.

First, The Myth of the Green Job. To examine this, one need to look no further than the wind turbine facility in Newton, Iowa, where President Obama toured touting the promise of the green job. This facility employs 500 individuals making $13 dollars per hour on average. At first blush that appears good, but then one must consider the fact that the turbine plant is a former Maytag factory which used to employ 1,800 employees making an average of $20 per hour. A net loss of 1,300 employees and $7 per hour equals $18.2 million in lost wages, not to mention the lost tax revenue in Newton that funds schools, police and fire departments, and other public works projects. Many of those lost manufacturing jobs ended up at Maytag's newer facility in Mexico. We believe the continued bleeding of manufacturing jobs to Mexico and other developing countries will hemorrhage under the Kerry-Boxer Climate Bill.

The concept of trying to create "green" jobs is relatively new and few economists so far have studied the concept, but the seminal research was conducted by the Spanish economist Dr. Gabriel Caldaza Alvarez. The underlying, indisputable fact about Spain's Green job program is that the government invested the equivalent of $753,788 for each green job created[4]. I don't think any economist would argue that was a good return on their investment. In addition, the vast number of green jobs Spain created in support of its solar industry over the last ten years are no longer in existence today according to former President Clinton and his Foundation, who reaffirmed these problems in Spain. Last May, in a speech in Madrid, former President Clinton stated Spain's decade-long program to subsidize the creation and continued existence of so-called green jobs through a massive infusion of taxpayer resources "has cost many jobs."

In addition, the definition of "green job" itself is undefined. Let me tell you what a "real" job – a coal mining job - means. It means a steady, above-average wage, benefits and a sense of community as mines last for decades in the same location. Given the above average wages and benefits, coal miners enjoy the highest standard of living in Appalachia. Additionally, if a coal miner owns anything, it's their home, and who are they going to sell their home to if there are no jobs? While I don't oppose the creation of new jobs, I would like to point out that those involved in the construction of solar arrays and wind turbines will develop technical expertise but will also be forced to move or travel to the location of the next project.

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[4] Alvarez, Gabriel Caldaza, *Study of the effects on employment of public aid to renewable energy sources*, Juan Carlos University, March 2009.

In the most comprehensive review of green jobs ever published, entitled "Green Jobs Myths," law and economics professors from the University of Illinois, York College of Pennsylvania, Case Western Reserve University and the University of Texas-Arlington concluded earlier this year that:

- No standard definition of a green job exists;
- Projections of green jobs include huge numbers of clerical, bureaucratic, and administrative positions that do not produce economy-enhancing goods and services for consumption;
- Studies predicting a promising future for green jobs make estimates using poor economic models and rely on dubious assumptions;
- By promoting more jobs instead of more productivity, green jobs are low-paying jobs in less desirable conditions;
- Green jobs require the sort of trade protectionism that would dramatically reduce our standard of living;
- Government-mandated green jobs are inferior to those created by free markets; and
- Green jobs rely on the assumption that significant technological progress can be simply ordered by government regulation — something that has never happened in history[5].

The legislation we speak of today does little to correct these problems, and in fact, perpetuates the problems that these noted scholars have outlined. A copy of the aforementioned paper is included as an attachment to my written testimony.

Second, Most Regions Lose Under Cap and Trade. While some areas of the country, such as California, the West coast, and the Northeast, do well under a cap and trade regime, most states and regions do not. For the most part, how well a region fares under cap and trade is based upon the energy intensity and the type of fuels consumed. The entire Midwest, through the Great Plains and the South are more dependent on fossil fuels such as coal, oil, and natural gas. In fact, aside from the two coasts, almost the entire country will see soaring energy costs, lost jobs, and a lower standard of living. This may be why of the 219 votes the Waxman Markey Bill received in the House, 117 of them came from Western coastal states and the Northeast. The cap and trade approach disproportionately impacts everything in between.

At the heart of the regional impact disparity is the three page analysis that EPA prepared for Senator Feingold of Wisconsin which shows that states such as California would receive a windfall at the cost of Midwestern States such as Wisconsin. This analysis was conducted on just one aspect of the Waxman-Markey Bill and I have attached it to my testimony. This three page analysis was attacked by environmental groups such as the Natural Resources Defense Council and the Center for American Progress for being a rushed job and not complete. To that I would counter that EPA's short analysis on the entire Kerry-Boxer Bill is even less complete and raises even more questions about regional impacts. I would hope that this Committee demands a more thorough analysis from EPA so that the members of this Committee and the entire Senate, and most importantly the American people, have a better understanding of what this Bill will do on a regional, State, and local level as well as at the national level.

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[5] Andrew P. Morriss, William T. Bogart, Andrew Dorchak, & Roger E. Meiners, "University of Illinois Law and Economics Research Paper Series No. LE09-001: Green Jobs Myths," University of Illinois College of Law.

Looking at my home state of Ohio, I believe that the job market and coal industry will be devastated as jobs get shipped overseas by proposed legislation. By 2030, Ohio jobs decline by a total of 79,700 under low cost case and by 108,600 under high cost case. The major cause of job losses would be lower industrial output due to higher energy prices, and greater competition from overseas manufacturers with lower energy costs[6].

The relative insignificance of U.S. coal industry emissions is further underscored by the fact that developing countries like China, India, Mexico, and Brazil are not, and will not, be obligated to reduce their emissions. The Kerry-Boxer bill does not force developing countries to cut or control their emissions. There is no international treaty that forces them to cut or control their emissions. Even if there were such a treaty in the future, the reality is that there is no way to enforce any future emissions reductions that developing countries might ostensibly agree to. Moreover, China and India have both expressly and repeatedly vowed not to cut their emissions.

As U.S. companies outsource jobs to China, India and Mexico to avoid the expense of hard emissions caps, they will also outsource their emissions. Kerry-Boxer won't reduce emissions so much as it will simply displace emissions.

Third, There is Very Little in This Bill to Help Coal. The supporters of both the Waxman-Markey and Kerry-Boxer Bills point to provisions that are supposed to encourage carbon capture and storage, or CCS. They claim that the inclusion of some funding for CCS will save the coal industry and coal jobs. While we applaud efforts to include provisions that aid the future and transition of coal into a carbon-constrained economy, nothing could be further from the truth – this bill kills the coal industry.

Simply throwing some funding at CCS is not going to make the technology available prior to 2020 or 2030. In fact the Kerry-Boxer Bill states that it's the Sense of the Senate that CCS needs to be fully deployed by 2030. Unfortunately that comes 18 years too late. Since the reductions begin in 2012, utilities will be forced to start making emissions reductions immediately. Since CCS will not be an available option, they will fuel switch to the more costly natural gas.

I am particularly disturbed by Section 182 of the Kerry-Boxer legislation on "Advanced Natural Gas Technologies." This provision authorizes EPA to carry out a program to provide grants for research and development of advanced technologies, including CCS, that reduce greenhouse gas emissions from natural gas-fueled electricity generation facilities. Legislation should not separate CCS funding by fuel source. This provision redirects CCS funding that should be used to develop general technologies that reduce emissions, but instead picks natural gas as a winning technology while hurting coal interests. CCS should be applicable to all carbon-emitting sources of energy, not for any fossil fuel in particular.

During the House debate we heard the specious argument that free credits to coal-fired utilities will ensure that coal continues to be used. Nothing could be further from the truth. All that free credits to utilities ensures is that they will have the credits to sell which will be used to finance fuel switching from coal to natural gas and permanently maiming the industry that dutifully provides over 50% of the United States' electricity.

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[6] American Council for Capital Formation and National Association of Manufacturers, "Ohio State impacts under Waxman-Markey." http://www.accf.org/media/docs/nam/2009/Ohio.pdf

In reports over the last eighteen months, both the General Accounting Office and the Congressional Research Service have outlined the myriad of public policy problems which need to be addressed in order to make CCS viable. Unfortunately, neither the Waxman-Markey Bill nor the Kerry-Boxer Bill addresses any of those issues in any meaningful way. The most the Bills do is call for reports back to Congress with recommendations on issues such as liability and other environmental issues. Today, the Obama Administration, their allies in Congress and national environmental groups attack the coal industry on multiple fronts including mountaintop mining, section 404 nationwide permits, coal fly ash, wetlands, and new performance standards. Call me skeptical, but it is hard to imagine Congress passing any legislation after cap and trade which makes CCS viable or any environmental organization supporting such legislation. Simply throwing some money at CCS, without addressing the policy issues blocking its development is viewed by our coal miners as a disingenuous attempt to buy their support. They are smart enough to know that if Congress doesn't remove the obstacles now, then they never will.

The issues which need to be addressed regarding CCS include: the implementation of a national pipeline system, including the regulatory framework; the property rights and general liability concerns; and the impact of the other environmental statutes such as the Clean Air Act, Superfund (CERCLA), the hazardous waste laws (RCRA), and the Safe Drinking Water Act. All of these issues have been enumerated in many reports including the previously mentioned GAO and CRS reports. While we certainly support and appreciate funding for projects that will contribute to the utilization of coal, Congress should not adopt climate legislation today that relies on technology and policy that is not neither deployable nor fully-developed.

Fourth, Scaring People with the Threat of the EPA is a Canard. Whether or not EPA acts to regulate carbon dioxide is a policy decision by the Obama Administration, and the Obama Administration can decide not to act. The Supreme Court ruled in Massachusetts v. EPA only that EPA *may* regulate carbon dioxide, not that it *must*. Furthermore, there are no provisions in the Kerry-Boxer Bill which will prohibit EPA from acting in addition to whatever legislation Congress passes. Those Senators who have stated that Congress must act in order to prevent EPA from acting are ignoring the fact that if the Kerry-Boxer Bill passes, then the American public will have the cap and trade regime on top of whatever regulatory decisions the Obama Administration decides.

The American public will not be fooled with Congress blaming EPA and EPA blaming the Supreme Court. If those members of Congress who are concerned with what EPA might do, then they need only pass a simple one sentence amendment to the Clean Air Act prohibiting such actions and codifying the intent of the authors of the 1990 Clean Air Act amendments that the legislation does not, in fact, cover carbon dioxide. Likewise the Obama Administration has great leeway under the Clean Air Act in terms of public health, which is specious at best, and welfare. In addition, the court case only spoke in terms of mobile sources, not stationary sources, and as far as the endangerment finding is concerned, EPA is making all of the decisions while trying to say they have no choice or options. If Congress does not want EPA to regulate CO_2 under the Clean Air Act, then Congress can stop EPA from doing so, instead of avoiding the serious debate that Senator Murkowski tried to have on the Senate floor. In that case we saw the Majority leadership stifle the debate and the EPA Administrator make unsubstantiated claims as to the impact and effect of the amendment. Furthermore, if this climate legislation is intended to supplant EPA's authority, then why does it not do so? The Kerry-Boxer Bill does not limit, stop, or otherwise curtail EPA's authority to regulate CO2.

Having a cap and trade mechanism destroys the coal industry. Duplicative regulations in addition to a legislatively-mandated program provides no opportunity for the coal industry to even make a stand and protect ourselves, our clients, and the American public who uses our low-cost electricity.

Adopting cap and trade legislation, with a simultaneous Renewable Electricity Standard (RES), effectively double taxes states like Ohio with limited access to renewable resources and a heavy reliance on coal. From the RES alone, industrial, coal-dependant states like Ohio could be looking at 20 percent electricity rate increases (affecting as many as 70% of electricity consumers) to cover the costs of power utilities being forced to up their purchases of renewable energy. When you layer on the costs of the cap and trade programs, the cost increases could be staggering. At this time, no government agency has done a thorough analysis of these multiple components together like in the Waxman-Markey bill, instead releasing cap and trade-only analyses.

A federal RES will result in a transfer of wealth negatively impacting Ohio because it is currently dependent on coal. States with the Congressionally-preferred resources will unduly benefit from the mandated purchase of credits by those without these resources in addition to the windfalls they would receive under a cap and trade program. State RES programs are designed with the resources of the geographic region in mind, while Congressional proposals we have seen greatly restrict the definition of "renewable" energy and do not factor in regional discrepancies.

In conclusion, the Kerry-Boxer Bill will end the use of coal as the lowest cost source of domestic energy because it relies upon technology that is at least fifteen to twenty years away at best, while at the same time not accomplishing anything real in terms of making that technology a real option. This will cause real hardship and a loss of jobs and a massive reduction in the standard of living for communities, States and regions across our country. Our coal miners and the members of our communities are not fooled by the empty promise of green jobs which will not occur in their towns or region, nor are they fooled into believing that Congress and the Obama Administration has no choice but to regulate us out of work.

Shutting down the entire U.S. coal industry for 100 years would only change atmospheric CO_2 levels over that time on the order of 3 percent — about the difference between CO_2 levels today and about 5 or 6 years ago. The EPA has made public a similar calculation. In response to a question at a Committee hearing earlier this year, EPA Administrator Lisa Jackson admitted that curbing U.S. greenhouse gas emissions without international cooperation would have no significant impact on atmospheric carbon dioxide levels.

We encourage Congress to consider these basic philosophies while debating climate change legislation:

1. Do not stigmatize and penalize business or consumer energy use;
2. Do not unfairly favor one form of energy over another;

3. Do not make energy needlessly expensive, especially during a time of economic decline and high unemployment;
4. Do not create policies that kill existing jobs and attempt to replace them with lower-paying jobs; and
5. Ensure that legislation actually protects the environment in quantifiable metrics.

We also encourage Congress to seek the best possible economic analyses of its legislation.

We believe that coal has an excellent future in the United States and will continue to provide high-wage jobs and low-cost electricity. According to the Energy Information Administration, the United States reserve of recoverable coal amounting to 262 billion short tons of coal[7]. With a production and consumption rate of 1.2 billion short tons of coal per year, our reserve base is over 3 times larger than the natural gas reserves[8] and can provide hundreds of years of low-cost electricity and manufacturing power. Thank you for your time and I look forward to any questions.

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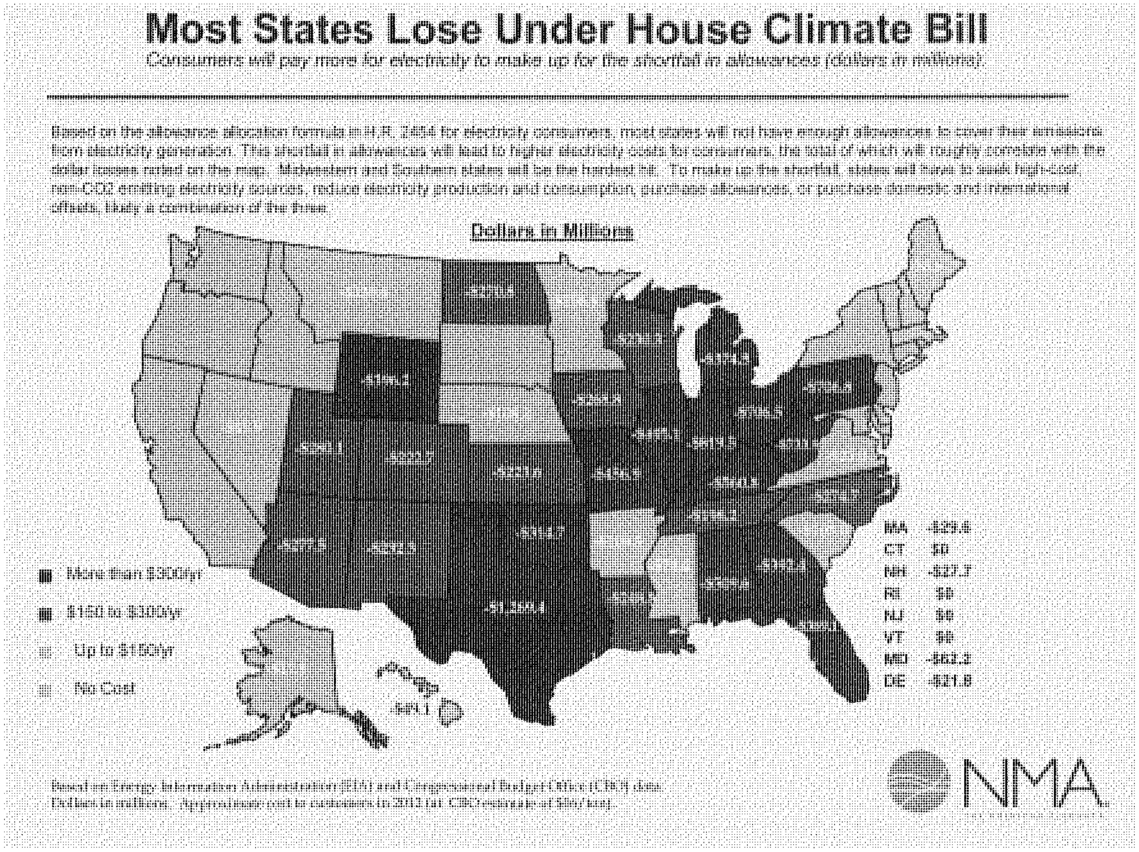
[7] http://www.eia.doe.gov/cneaf/coal/reserves/reserves.html. Please note that a short ton is 2000 lbs. A metric tonne is 2204 lbs.

[8] As expressed in a barrel of oil (BOE) equivalent, coal's 262 billion short tons of reserves equates to 903.9 billion BOE, while natural gas's 1400.4 trillion cubic feet of reserves is only equal to 248.2 billion BOE. Congressional Research Service, "Terminology, Reporting, and Summary of U.S. Fossil Fuel Resources," October 20, 2009.



Most States Lose Under House Climate Bill

Consumers will pay more for electricity to make up for the shortfall in allowances (dollars in millions).

Based on the allowance allocation formula in H.R. 2454 for electricity consumers, most states will not have enough allowances to cover their emissions from electricity generation. This shortfall in allowances will lead to higher electricity costs for consumers, the total of which will roughly correlate with the dollar losses noted on the map. Midwestern and Southern states will be the hardest hit. To make up the shortfall, states will have to seek high-cost, non-CO2 emitting electricity sources, reduce electricity production and consumption, purchase allowances, or purchase domestic and international offsets, likely a combination of the three.

Dollars in Millions

MA	-$29.6
CT	$0
NH	-$27.7
RI	$0
NJ	$0
VT	$0
MD	-$62.2
DE	-$21.8

- ■ More than $300/yr
- ■ $150 to $300/yr
- ▨ Up to $150/yr
- ▨ No Cost

Based on Energy Information Administration (EIA) and Congressional Budget Office (CBO) data.
Dollars in millions. Approximate cost to consumers in 2012 (at CBO estimate of $16/ton).

NMA

United States Government Accountability Office

GAO

Report to the Chairman of the Select Committee on Energy Independence and Global Warming, House of Representatives

September 2008

CLIMATE CHANGE

Federal Actions Will Greatly Affect the Viability of Carbon Capture and Storage As a Key Mitigation Option

GAO

Accountability * Integrity * Reliability

GAO-08-1080

GAO Highlights

Highlights of GAO-08-1080, a report to the Chairman of the Select Committee on Energy Independence and Global Warming, House of Representatives

Why GAO Did This Study

Key scientific assessments have underscored the urgency of reducing emissions of carbon dioxide (CO_2) to address climate change. Many have cited carbon capture and storage (CCS) as an essential technology because it has the potential to greatly reduce CO_2 emissions from power plants while allowing for projected increases in electricity demand. CCS involves capturing CO_2 from a power plant's emissions, transporting it to an underground storage location, and then injecting it into a geologic formation for long-term storage.

As requested, GAO examined (1) key economic, legal, regulatory, and technological barriers impeding commercial-scale deployment of CCS technology and (2) actions the Department of Energy (DOE), Environmental Protection Agency (EPA), and other agencies are taking to overcome barriers to commercial-scale deployment of CCS technology. Among other things, GAO examined key studies and contacted officials from pertinent agencies, companies, and environmental groups, as well as research and other organizations.

What GAO Recommends

Among GAO's recommendations are that (1) DOE continue to place greater emphasis on CO_2 capture at existing power plants and (2) EPA examine how its statutory authorities can be used to address potential CCS barriers. DOE neither explicitly agreed nor disagreed with the first recommendation. EPA expressed general agreement with the second recommendation.

To view the full product, including the scope and methodology, click on GAO-08-1080. For more information, contact John Stephenson at (202) 512-3841 or stephensonj@gao.gov.

September 2008

CLIMATE CHANGE

Federal Actions Will Greatly Affect the Viability of Carbon Capture and Storage As a Key Mitigation Option

What GAO Found

Nationally-recognized studies and GAO's contacts with a diverse group of industry representatives, nongovernmental organizations, and academic researchers show that key barriers to CCS deployment include (1) underdeveloped and costly CO_2 capture technology and (2) regulatory and legal uncertainties over CO_2 capture, injection, and storage. Key technological barriers include a lack of experience in capturing significant amounts of CO_2 from commercial-scale power plants and the significant cost of retrofitting existing plants that are the single largest source of CO_2 emissions in the United States. Regulatory and legal uncertainties include questions about liability concerning CO_2 leakage and ownership of CO_2 once injected. According to the National Academy of Sciences and other knowledgeable authorities, another barrier is the absence of a national strategy to control CO_2 emissions (emissions trading plan, CO_2 emissions tax, or other mandatory control of CO_2 emissions), without which the electric utility industry has little incentive to capture and store its CO_2 emissions. Moreover, according to key agency officials, the absence of a national strategy to control CO_2 emissions has also deterred their agencies from resolving other important practical issues, such as how sequestered CO_2 will be transported from power plants to appropriate storage locations and how stored CO_2 would be treated in a future CO_2 emissions trading plan.

Federal agencies have begun to address some CCS barriers but have yet to comprehensively address the full range of issues that would require resolution for large-scale CCS deployment:

- *DOE's* research strategy has, until recently, devoted relatively few resources to lowering the cost of CO_2 capture from existing coal-fired power plants, focusing instead on innovative technologies applicable to new plants. In recent years, however, the agency has begun to place greater emphasis on CCS technologies applicable to existing facilities.

- *EPA* issued in July 2008 a proposed rule to guide the permitting of large volume, or commercial-scale, CO_2 injections. It addressed at least some of the key issues under the Safe Drinking Water Act but left other issues related to EPA's implementation of its air, hazardous waste and substance statutes unresolved.

- *Other agencies,* such as Interior and Transportation, have jurisdiction over a number of interdisciplinary issues that could delay CCS deployment if unaddressed, but which have thus far received little attention. These include, among others, a legal and regulatory regime for a national CO_2 pipeline infrastructure and a plan for addressing CO_2 emissions reductions from CCS in a future emissions trading plan. In addition, unless the effects of CCS deployment are clearly explained, public opposition could delay future CCS projects.

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Abbreviations

AoR	Area of Review
BLM	Bureau of Land Management
CCS	carbon capture and storage
CCTP	Climate Change Technology Program
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CO_2	carbon dioxide
DOE	Department of Energy
EPA	Environmental Protection Agency
ETS	Emissions Trading Scheme
EU	European Union
FERC	Federal Energy Regulatory Commission
IEA	International Energy Agency
IGCC	Integrated Gasification Combined Cycle
IPCC	Intergovernmental Panel on Climate Change
MIT	Massachusetts Institute of Technology
NSR	New Source Review
PHMSA	Pipeline and Hazardous Materials Safety Administration
RCRA	Resource Conservation and Recovery Act
SDWA	Safe Drinking Water Act
SO_2	sulfur dioxide
STB	Surface Transportation Board
UIC	Underground Injection Control
UNFCCC	United Nations Framework Convention on Climate Change
USGS	U.S. Geological Survey

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GAO
Accountability * Integrity * Reliability

United States Government Accountability Office
Washington, DC 20548

September 30, 2008

The Honorable Edward Markey
Chairman
Select Committee on Energy Independence
and Global Warming
House of Representatives

Dear Mr. Chairman:

Key scientific assessments have underscored the urgency of reducing emissions of carbon dioxide (CO_2), the most significant greenhouse gas, to help mitigate the negative effects of climate change. Given the United States' heavy reliance on coal-burning power plants that emit significant quantities of CO_2, many have cited carbon capture and storage (CCS) as an essential technology because it can greatly reduce CO_2 emissions from these facilities, while allowing for projected increases in electric power demand.[1] CCS is a process of separating CO_2 from other gases produced in fuel combustion and other industrial processes, transporting the CO_2 via pipeline to an underground storage location, and injecting and storing it long-term in underground geologic formations.

While other climate mitigation options exist—such as energy efficiency improvements, a switch to less carbon-intensive fuels, nuclear power, and renewable energy sources—CCS is considered by many to be a crucial component of any U.S. approach or strategy for addressing the climate change problem, particularly given the United States' current reliance on coal for almost half of its electricity production. Moreover, there is a large potential role for CCS in rapidly developing countries, such as China and India, which will be relying increasingly on coal to meet their energy needs. In fact, as of 2007, Chinese CO_2 emissions likely exceeded those of the United States, according to the International Energy Agency (IEA).[2]

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[1] CCS can also be used to reduce the CO_2 emissions from industrial production of hydrogen, chemicals, substitute natural gas, and transportation fuels.

[2] The International Energy Agency (IEA) is an intergovernmental organization founded in 1974 that acts as energy policy advisor to 27 member countries. The IEA's current work focuses on climate change policies, market reform, and energy technology collaboration and outreach.

The IEA projects continued growth in CO_2 emissions from China and other developing economies.

At present, there are few commercial-scale CCS projects in operation. While recent assessments by the IEA and the Intergovernmental Panel on Climate Change (IPCC) have indicated that CCS could be a key contributor to controlling greenhouse gas emissions worldwide,[3] a number of barriers may preclude its widespread use. Therefore, many organizations, including the IEA, emphasize that it will be critical to overcome these barriers and demonstrate the feasibility of this technology. In this context, this report examines (1) the key economic, legal, regulatory, and technological barriers impeding commercial-scale deployment of CCS technology and (2) the actions federal agencies are taking to overcome barriers to or facilitate the commercial-scale deployment of CCS technology.

To examine barriers to CCS, we conducted a literature review and synthesized CCS-related information contained in a number of key reports, including those by the IPCC, the National Academy of Sciences, and by various federal agencies. We also contacted a nonprobability sample of electric power companies, major oil and gas companies, CO_2 pipeline owners, environmental organizations, and researchers at think tanks and universities to determine their perspectives on key barriers to CCS deployment at commercial scale. We selected major U.S. energy producing companies, as well as organizations and researchers that participate actively in ongoing dialogues on CCS. We also selected a number of smaller companies and organizations to ensure that we obtained a broader range of perspectives on key issues.[4] We used a semistructured interview guide to (1) obtain information from individual stakeholders on key barriers to CCS deployment at commercial scale and (2) facilitate an aggregate analysis of stakeholder perspectives on key barriers to CCS.

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[3] The Intergovernmental Panel on Climate Change (IPCC) is a scientific body set up by the World Meteorological Organization and by the United Nations Environment Programme. The IPCC was established to provide decision makers with an objective source of information about climate change.

[4] Results from nonprobability samples cannot be used to make inferences about a population. This is because, in a nonprobability sample, some elements of the population being studied have no chance or an unknown chance of being selected as part of the sample.

To examine federal actions to address CCS barriers, we obtained and analyzed information from the Environmental Protection Agency (EPA), the Department of Energy (DOE), and other federal agencies regarding their CCS-related activities. We collected 12 years of budget information from DOE's Coal Program and followed up on recommendations contained in two recent EPA and DOE advisory committee reports. We also attended two EPA Underground Injection Control program workshops and followed up with EPA officials on stakeholder concerns expressed at these meetings. Using the methodology described for our first objective, we obtained the perspectives of industry stakeholders, environmental organizations, and researchers at think tanks and universities on federal agency actions to overcome barriers to, or to facilitate deployment of, commercial-scale CCS in the United States. We conducted this performance audit from October 2007 to September 2008 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Results in Brief

Nationally-recognized studies and our contacts with a diverse group of industry representatives, nongovernmental organizations, and academic researchers show that key barriers to CCS deployment include (1) underdeveloped and costly CO_2 capture technology and (2) regulatory and legal uncertainties over CO_2 capture, injection, and storage. Among the key technological barriers are a lack of experience in capturing significant amounts of CO_2 from power plants and the significant cost of capturing CO_2, particularly from existing coal-fired power plants, which are the single largest source of CO_2 emissions in the United States. Compounding these technological issues are regulatory and legal uncertainties, including uncertainty regarding liability for CO_2 leakage and ownership of CO_2 once injected. According to the IPCC, the National Academy of Sciences, and other knowledgeable authorities, another barrier is the absence of a national strategy to control CO_2 emissions (emissions trading plan, CO_2 emissions tax, or other mandatory control of CO_2 emissions), without which the electric utility industry has little incentive to capture and store its CO_2 emissions. Moreover, according to key agency officials, the absence of a national strategy has also deterred their agencies from addressing other important practical issues, such as resolving how stored CO_2 would be treated in a future CO_2 emissions trading plan.

Federal agencies have begun to address some CCS barriers but have yet to comprehensively address the full range of issues that would require resolution for commercial-scale CCS deployment:

- *Key technological barriers.* DOE has achieved limited results in lowering the cost of CO_2 capture from existing coal-fired power plants. A major reason is that the agency has focused on "Integrated Gasification Combined Cycle" (IGCC) technology, a promising technology for new coal-fired power plants, but one that is less useful when applied to existing coal power plants. The agency has only recently begun to shift toward an approach that also emphasizes CCS technologies applicable to existing power plants.

- *Key legal and regulatory barriers.* The EPA issued a proposed rule in July 2008 concerning underground injection of CO_2 for geologic sequestration. Because of the large injection volumes associated with geologic sequestration, this proposed rule would apply to commercial-scale injections. The proposed rule was issued under the agency's Safe Drinking Water Act (SDWA) authority. However, some issues that fall outside of this authority are still unresolved. These include whether and how the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA) apply to injected CO_2. Also unresolved are issues concerning how the Clean Air Act's requirements will apply to existing power plants that install CCS.

- *Other considerations.* Even if the DOE- and EPA-related issues are resolved, there are a number of issues, many of which cross the jurisdictions of multiple agencies, that could delay CCS deployment if not addressed in a timely fashion. These include whether the federal government could be held liable if CO_2 stored below public lands leaked onto adjoining nonfederal property. In addition, a number of federal agencies (such as the Federal Energy Regulatory Commission, the Surface Transportation Board, Department of Transportation, DOE, and EPA) will need to work together to examine how CO_2 pipeline infrastructure might be regulated to accommodate commercial-scale CCS. Others will need to devise a plan for how CO_2 emissions reductions from CCS will be treated in a future emissions trading scheme.

We are making a number of recommendations to agencies with major CCS-related responsibilities to address key barriers to CCS deployment. To better ensure that DOE's research and development efforts address CCS at both new coal-fired power plants and existing plants, we are recommending that DOE continue its recent practice of placing a greater emphasis on technologies that can reduce CO_2 emissions from existing coal-fired power plants. In commenting on a draft of this report, DOE's September 9, 2008, letter neither explicitly agreed nor disagreed with this recommendation but included a number of comments that recognized a need for increased funding for CO_2 emissions control technologies for existing coal-fired power plants.

To enhance EPA's ability to address barriers that may be affecting CCS deployment, we are recommending that EPA more comprehensively examine barriers to CCS development beyond those relevant to the SDWA, by addressing issues under RCRA, CERCLA, and other statutes within the agency's jurisdiction. EPA's September 12, 2008, letter responded that providing regulatory certainty on issues related to geological storage of CO_2 was a high priority for the agency and agreed with the intent of the recommendation—to provide clarity on how statutes within the agency's jurisdiction may apply. The agency noted that it had made an initial effort to identify and discuss these issues in the preamble of its July 2008 proposed rulemaking and had requested comments on many of the SDWA topics—including some of those identified in our report. It said it expected further progress on the SDWA topics after receiving input from stakeholders during the comment period (which extends through November 24, 2008).

Finally, we are recommending that an interagency task force (or similar mechanism) be established to develop a comprehensive strategy that guides cognizant federal agencies in resolving remaining issues that, if not addressed proactively, could impede commercial-scale CCS deployment. DOE maintained that a coordinating body—the DOE-led Climate Change Technology Program (CCTP)—already addresses these kinds of issues. However, the CCTP's scope focuses on technology; it does not address legal and institutional issues, such as the resolution of CO_2 pipeline regulation and infrastructure, among others. In addition, officials from cognizant offices within the Departments of the Interior and Transportation told us they have not yet been invited to participate in CCTP discussions. Moreover, we continue to believe that a more centralized task force with a broader mission, perhaps authorized by the Executive Office of the President, would be a preferable alternative.

DOE's and EPA's comments are addressed at the end of this letter and reproduced in appendixes II and III, respectively (along with our responses to each of their main points). The agencies also provided technical comments separately, which have been incorporated in our final report, as appropriate. In addition, we sought and received clarification and verification on specific issues from the Department of the Interior's

Bureau of Land Management and U.S. Geological Survey; the Department of Transportation's Pipeline and Hazardous Materials Safety Administration; the Federal Energy Regulatory Commission; and the Surface Transportation Board, and have incorporated their input in finalizing the report.

Background

There is growing concern about climate change and the impact it will have on people and the ecosystems on which they depend. According to the National Academy of Sciences, global temperatures have already risen 1.4 degrees Fahrenheit since the start of the 20th century—with much of this warming occurring in the last 30 years alone—and temperatures will likely rise at least another 2 degrees Fahrenheit, and potentially more than 11 degrees, over the next 100 years. This warming will cause significant changes in sea level, ecosystems, and ice cover, among other impacts. In the Arctic region, temperatures have increased almost twice as much as the global average, and the landscape is changing rapidly. Most scientists agree that the warming in recent decades has been caused primarily by human activities that have increased the amount of greenhouse gases in the atmosphere. Greenhouse gases, such as CO_2, have increased markedly since the Industrial Revolution, mostly from the burning of fossil fuels for energy, industrial processes, and transportation. According to the National Academy of Sciences, CO_2 levels are at their highest in at least 650,000 years and continue to rise.

In 1992, the first major multilateral treaty on global warming, the United Nations Framework Convention on Climate Change (UNFCCC), was finalized. One hundred ninety-two countries, including the United States, have ratified this treaty and agreed to its objective to "achieve…stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." The UNFCCC required signatory states to publish greenhouse gas emission levels; formulate a national response to climate change; and develop and distribute technologies to control, reduce, or prevent greenhouse gas emissions. However, its mitigation provisions focused on voluntary efforts by signatory states. Under the Kyoto Protocol to the UNFCCC, 37 industrialized countries have agreed to reduce or limit their greenhouse gas emissions by an average of 5 percent below 1990 levels between 2008 and 2012. Also, in 2005, the European Union (EU) began implementing its Emissions Trading Scheme (ETS), a program that limits CO_2 emissions in each member state and is intended to help states achieve their commitments under the Kyoto Protocol. Many countries with significant greenhouse gas emissions, including the United States, China, and India, have not committed to binding limits on emissions through the Kyoto Protocol or other mechanisms as of the date of this report. Despite the UNFCCC's ratification, global annual fossil fuel-related CO_2 emissions increased from an average of approximately 23.5 billion metric tons of CO_2 per year in the 1990's to approximately 26.4 billion metric tons of CO_2 per year from 2000 to 2005.[5]

A complicating factor in addressing this increase in temperature is the heavy reliance by the United States and other countries on coal-fired power plants for electric power generation. Coal accounts for about half of electricity generation in the United States. Moreover, according to the IEA, coal is used to produce more than half of several other nations' electricity, including South Africa, Poland, China, Australia, and India.

Coal-fired power plants are one of the largest sources of CO_2 emissions. In the United States, coal-fired power plants account for approximately one-third of total CO_2 emissions. Figure 1 shows total U.S. CO_2 emissions, what portions are from each sector of the economy, and sources where CCS could more readily be used.[6]

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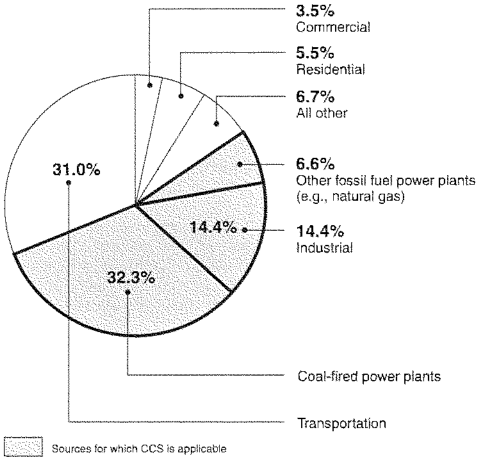
[5] The IPCC notes that these emissions include those from the production, distribution, and consumption of fossil fuels and as a by-product from cement production. The data from 2004 and 2005 are interim estimates.

[6] CCS is not considered suitable for reducing emissions from the transportation, residential, and commercial sectors because sources in these sectors tend to emit small quantities of CO_2.

Figure 1: Contribution of Coal-Fired Power Plants and Other Sources to Total U.S. CO_2 Emissions



Source: GAO analysis of data from the Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006* (April 2008).

To complicate matters further, increased energy demands are projected for the future, both in the United States and worldwide. The IEA projects that if governments around the world proceed with current policies, the world's energy needs would be over 50 percent higher in 2030 than today.[7] For the United States, an assessment by DOE's Energy Information Administration indicates that electricity sales will increase 29 percent by 2030, if current policies continue. Moreover, the IEA anticipates that the two largest developing countries—China and India—will drive increased demand for coal to meet growing electricity demand. The IEA notes that China and India's heavy reliance on coal has already contributed significantly to recent increases in global CO_2 emissions, with China likely overtaking the United States as the largest CO_2 emitter in 2007.

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[7] The IEA's 2007 *World Energy Outlook* also assesses two alternative scenarios. These include a scenario in which world demand for energy and coal generally increases less than otherwise expected due to changes in government policies that address climate change concerns and a scenario in which world demand increases more than otherwise expected due to higher rates of economic growth in China and India.

In order to prevent this dramatic increase in coal-based energy production from emitting significant amounts of CO_2 to the atmosphere, many are suggesting CCS as a unique tool that allows for continued coal use, while mitigating its associated effect on the climate. The IEA identifies CCS and other clean coal technologies as one of the most promising routes for mitigating emissions and notes that "CCS could reconcile continued coal burning with the need to cut emissions in the longer term." Similarly, the IPCC notes that CCS would help preserve existing energy infrastructure, thereby restraining the cost of emissions reductions. Looking ahead, the IEA projects that CCS could contribute to 21 percent of avoided emissions to stabilize atmospheric CO_2 concentrations at 450 parts per million, a level which is projected to limit the average increase in global temperature to 2.4 degrees Celsius (4.3 degrees Fahrenheit).

The EU is also beginning to highlight the importance of CCS in addressing climate change. In 2008, the EU proposed legislation, known as a proposed directive, on the geological storage of CO_2 that would support the EU policy of limiting global average temperature increases to less than 2 degrees Celsius (3.6 degrees Fahrenheit). Specifically, in 2007, the European Council urged EU member states and the European Commission to develop the necessary technical, economic, and regulatory framework to remove existing legal barriers to CCS so that the technology can be applied to new fossil fuel power plants by 2020, if possible. The following year, the European Commission proposed legislation that would create a legal framework for capture, transport, and geological storage of CO_2 within member states' territories.

CCS is comprised of multiple processes, including CO_2 capture and compression; transport of the CO_2 to a storage location; injection and storage in geologic formations; and monitoring to verify that the CO_2 is staying in place. A successful CCS system must integrate all of them. The first step in CCS is identifying and verifying a suitable location for CO_2 storage. Next, CO_2 would be captured at power plants and other large industrial sources. The goal of CO_2 capture is to produce a concentrated stream of nearly pure CO_2 at high pressure so that it can be transported via pipeline to a storage site. Regardless of the capture approach used, additional energy, often referred to as the energy penalty, is required for capture and compression. Three major approaches to capturing or separating CO_2 from industrial sources have been identified—pre-combustion capture, post-combustion capture, and oxyfuel combustion capture.[8]

After CO_2 capture and compression, the compressed gas, now in a supercritical state,[9] would likely be transported via pipeline to a storage site, unless a storage site was available at the capture facility. Once at a storage site, the CO_2 would likely be injected well below the surface, at depths of over 800 meters, or about 2,600 feet, into geologic formations thought to be conducive for long-term sequestration (that is, hundreds to thousands of years) from the atmosphere. When injected, the CO_2 is sequestered by a combination of physical and geochemical trapping processes.

Physical trapping occurs because the relatively buoyant CO_2 reaches a layer of rock that inhibits further upward migration. Geochemical trapping occurs when the CO_2 reacts chemically with minerals in the geologic formation that result in the precipitation of solid minerals. Geologic formations, such as depleted oil and gas reservoirs and saline formations, are thought to be particularly favorable for CO_2 storage. These formations tend to have high porosity, or an abundance of pores for CO_2 to fill in, and an impermeable barrier, known as a solid caprock, to keep the buoyant CO_2 from migrating to the surface. Figure 2 depicts CO_2 capture, transport, and storage in geologic formations and highlights the characteristics of caprock and the underlying rock that are favorable for CO_2 storage. DOE and IEA estimates indicate that the United States has appropriate geology that could potentially store over 3 trillion tons of CO_2—enough to store 1,000 years of CO_2 emissions from nearly 1,000 coal-fired power plants.

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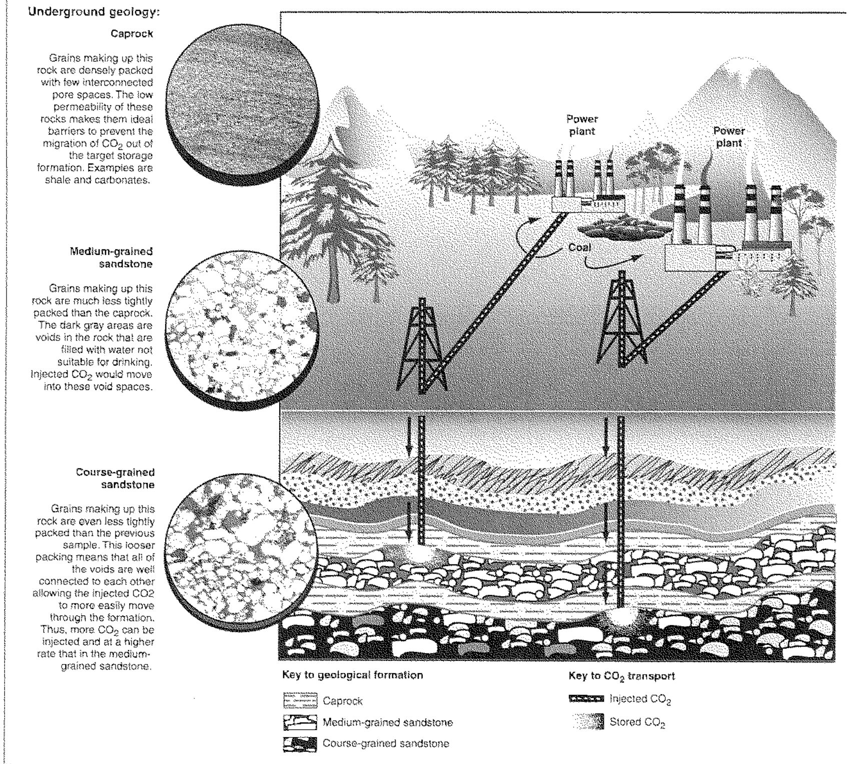
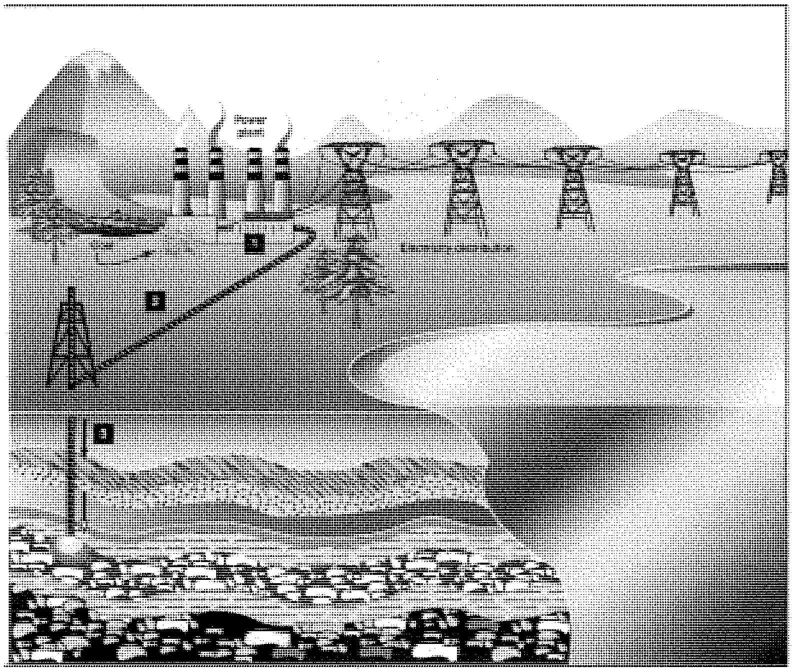
[8] This report focuses primarily on pre- and post-combustion capture.

[9] When the temperature and pressure of CO_2 are increased, the CO_2 enters a fluid, or supercritical state.

Figure 2: CO_2 Capture, Transport, and Storage in Geologic Formations


Underground geology:
Caprock
Grains making up this rock are densely packed with few interconnected pore spaces. The low permeability of these rocks makes them ideal barriers to prevent the migration of CO_2 out of the target storage formation. Examples are shale and carbonates.
Medium-grained sandstone
Grains making up this rock are much less tightly packed than the caprock. The dark gray areas are voids in the rock that are filled with water not suitable for drinking. Injected CO_2 would move into these void spaces.
Course-grained sandstone
Grains making up this rock are even less tightly packed than the previous sample. This looser packing means that all of the voids are well connected to each other allowing the injected CO2 to more easily move through the formation. Thus, more CO_2 can be injected and at a higher rate that in the medium-grained sandstone.
Power plant
Power plant
Coal
Key to geological formation
Caprock
Medium-grained sandstone
Course-grained sandstone
Key to CO_2 transport
Injected CO_2
Stored CO_2

Source: GAO analysis of IPCC and Joint Global Change Research Institute, Battelle Pacific Northwest Division data.



Steps in the CO_2 storage process

- 1 CO_2 capture
- 2 CO_2 transport
- 3 CO_2 injection and storage

Multiple federal agencies have programs and other responsibilities that will affect CCS deployment, but the key ones are administered primarily by DOE and EPA:

- DOE is the lead federal agency for supporting the development of clean coal technology, including CCS technology. The agency established the Carbon Sequestration program in 1997 to ascertain the technical viability of CCS. The core research and development in the program involves laboratory and pilot-scale research in areas that include CO_2 capture and storage. The demonstration and deployment element of the program is designed to show the viability of CCS technologies at a scale large enough to overcome real and perceived infrastructure challenges. In order to do so, DOE established a network of seven Regional Carbon Sequestration Partnerships to develop the technology, infrastructure, and regulations necessary to implement CO_2 storage in different regions of the nation. Other DOE programs are also developing technologies related to coal-fueled power generation with CO_2 capture; including (1) the Advanced Integrated Gasification Combined Cycle (IGCC) program to support development of gasification technology to enable CO_2 capture; (2) the restructured FutureGen program to demonstrate IGCC or other advanced coal technology, as well as CO_2 capture; (3) the Innovations for Existing Plants program, which has recently focused more attention on developing technology to facilitate CO_2 capture at existing coal-fired power plants; and (4) the Clean Coal Power Initiative, which is supporting advanced coal-based technologies that capture and sequester CO_2 emissions.

- EPA has authority under the SDWA to regulate underground injections of various substances, including nonhazardous and hazardous wastes into injection wells. Injection wells have a range of uses that traditionally include waste disposal, enhancing oil production, and mining. The SDWA requires EPA to develop minimum federal requirements for injection practices that protect public health by preventing injection wells from endangering underground sources of drinking water. There are five different well types: Class I (injections of hazardous wastes, industrial nonhazardous wastes, municipal wastewater); Class II (injections associated with enhanced oil and gas production); Class III (injections associated with mineral extraction); Class IV (now mostly banned,[10] but formerly, to inject hazardous or radioactive waste above or into an underground source of drinking water); and Class V (wells not included in other classes, including wells used in experimental technologies, such as pilot CO_2 storage).[11] EPA has given 33 states primacy, or primary enforcement responsibility, to administer the Underground Injection Control (UIC) program, and 7 states have partial responsibility for administering the UIC program.[12]

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[10] An exception is made for groundwater remediation at hazardous waste sites.

- The prospect of widespread, nationwide use of CCS would also require the involvement of other agencies with varied responsibilities. The Department of the Interior's Bureau of Land Management, for example, would have broad jurisdiction over CO_2 injected on public lands. Whether the Federal Energy Regulatory Commission or the Surface Transportation Board would have regulatory responsibilities for pipelines transporting captured CO_2 is an issue that needs to be resolved. The CCTP, authorized by the Energy Policy Act of 2005, is tasked with assisting the interagency coordination of climate change technology research, development, demonstration, and deployment. Because the CCTP coordinates interagency discussion of climate change technology issues, it will likely also be involved in any ongoing interagency dialogue on CCS deployment.

Barriers to CCS Deployment Include the High Cost of Current Technologies, Regulatory Uncertainty, and the Lack of a National Strategy to Control CO_2 Emissions

Nationally-recognized studies and our contacts with a diverse group of industry representatives, nongovernmental organizations, and academic researchers show that key barriers to CCS deployment include (1) the high cost of, and lack of experience with, CO_2 capture technologies and (2) regulatory uncertainties concerning CO_2 capture, injection, and storage. Among the technological barriers impeding CCS deployment at coal-burning power plants are the significant cost of retrofitting existing coal-fired power plants and lack of commercial-scale demonstrations. Compounding these technological issues are uncertainties over regulatory and legal issues, including legal uncertainty regarding liability for CO_2 leakage and ownership of CO_2 once injected. According to the IPCC, the National Academy of Sciences, and other knowledgeable authorities, another barrier is the absence of a national strategy to control CO_2 emissions (emissions trading plan, CO_2 emissions tax, or other mandatory control of CO_2 emissions), without which the electric utility industry has little incentive to capture and store its CO_2 emissions. Moreover, according to key agency officials, the absence of a national strategy to control CO_2 emissions has also deterred their agencies from resolving other important practical issues, such as how stored CO_2would be treated in a future CO_2 emissions trading plan.

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[11] Class V wells are typically shallow wells that place a variety of fluids directly below the land surface.

[12] EPA administers the UIC program in 10 states and for all Indian tribes.

CO_2 Capture Must Overcome Significant Technological Hurdles to be a Cost-Effective Technology for Coal-Fired Power Plants

Capturing CO_2 from large electric power plants, particularly coal-fired power plants, entails a number of technological challenges that affect its cost of deployment, and hence its appeal to industry. Among these challenges are (1) the absence of any commercial-scale demonstration of the technology at a power plant; (2) certain limitations of coal gasification technology for capturing CO_2 emissions at new power plants; and (3) the high cost of retrofitting CCS to existing pulverized coal-fired power plants that will, for the next several decades, account for a significant share of U.S. CO_2 emissions.

CCS Has Yet to Be Demonstrated on a Commercial Scale at a Power Plant

To date, there have been several small-scale tests of CO_2 capture at power plants in the United States and other countries, but these demonstration projects have typically removed CO_2 from only a small fraction of the power plant's overall output. Large-scale demonstrations of CO_2 capture at a power plant have been identified as an important step in improving capture technology, as well as securing industry support for CCS. Hence, the DOE Carbon Sequestration Program's program plan notes that the testing of CCS technologies at a larger scale is important to identify and eliminate technical and economic barriers to commercialization of CCS technology. With the need to accelerate the testing of innovative technologies in mind, two key international organizations—the IEA and the Carbon Sequestration Leadership Forum—recommend that a minimum of 20 full-scale CCS demonstration projects be implemented worldwide by 2020.

In a similar vein, a DOE advisory committee, the National Coal Council, noted that larger-scale demonstrations will be necessary to secure industry support. It noted, in particular, that "deployment will require successful pilot-scale testing and operation at a demonstration scale of 50 to 100 megawatts before companies will have confidence in their cost and performance for large scale systems."[13] Similar opinions were offered by several of the stakeholders we interviewed, who told us they thought it would be helpful for testing to focus more on actual demonstrations, rather than laboratory testing. For example, two electric power company officials told us they thought testing on a larger scale was important because the reliability of power plants with carbon management has not been adequately considered.

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[13] National Coal Council, *Technologies to Reduce or Capture and Store Carbon Dioxide Emissions* (June 2007).

Despite the importance of gaining this kind of experience with CO_2 capture, CO_2 capture has not been demonstrated on a large scale at a power plant in the United States or in any other country. The IPCC's Special Report on CCS observed that "there have been no applications [of carbon capture] at large-scale power plants of several hundred megawatts" and emphasized the significance of this omission by cautioning that large-scale power plants are the major source of current and projected CO_2 emissions.

It should be noted that some progress has been made in testing CCS at other types of industrial facilities. Specifically, four industrial facilities have received attention as major demonstrations of CO_2 capture and storage technology. These facilities presently capture and store anthropogenic CO_2 on a large scale.[14] Three of these projects involve separation of CO_2 from natural gas: the Sleipner and Snohvit projects, located off the coast of Norway, and the In Salah project in Algeria. The fourth project captures CO_2 at a facility in North Dakota, where coal is gasified to make methane. The captured CO_2 is then injected at an oil field in Weyburn, Canada for the purposes of enhanced oil recovery and to permanently store almost all of the injected CO_2.

CO_2 capture has also been demonstrated at other industrial facilities, including plants that purify natural gas and produce chemical products (ammonia, alcohols, and synthetic liquid fuels). For example, one existing industrial application of CO_2 capture is to remove CO_2 from natural gas—a process called natural gas sweetening—to prevent pipeline corrosion and increase the heating value of the gas. However, much of the CO_2 captured at these facilities is currently vented to the atmosphere because there is no requirement or incentive to store it.[15]

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[14] The IEA defines large scale as injecting over 0.5 Mt (500,000 metric tons) per year.

[15] The IPCC Special Report on CCS notes that some of the CO_2 captured from natural gas processing and ammonia production facilities is used for enhanced oil recovery, a process which may result in the sequestration of a substantial amount of the CO_2 from the atmosphere.

Nonetheless, according to the IPCC and other knowledgeable authorities, key differences may inhibit the transferability of CO_2 capture at these facilities to coal-fired power plants:

- *Lower CO_2 concentrations at coal-fired power plants.* A study by researchers at the Massachusetts Institute of Technology (MIT) indicated that industrial processes, such as natural gas processing and ammonia production, produce highly concentrated streams of CO_2 as a byproduct, facilitating CO_2 capture.[16] By contrast, CO_2 is relatively diffuse in the exhaust, or flue gas, produced by coal power plants—about 13 to 15 percent by volume—making CO_2 capture substantially more energy intensive.
- *Challenges in adapting the CO_2 removal process to power plants.* The most commonly-used chemical method for removing CO_2 from natural gas may be challenging to adapt to capture at power plants. According to the IPCC Special Report on CCS, CO_2 is most commonly removed from natural gas using chemical solvents. However, DOE officials told us that one such commonly used solvent, monoethanolamine, is not designed to cost-effectively remove the dilute concentrations of CO_2 from the extremely large volumes of flue gas produced by pulverized coal power plants.

The IPCC report noted that applying CO_2 capture and sequestration only at these types of industrial facilities—and not at other facilities, such as coal-fired power plants—would contribute only marginally to addressing climate change. Specifically, it estimates that CO_2 capture, if widely used at natural gas sweetening facilities, would account for less than 1 percent of CO_2 emissions per year from large stationary sources.

Coal Gasification Technology Offers Promise in Capturing CO_2 at New Plants but Has Limitations That May Impede Its Widespread Use

DOE has pursued gasification technology—specifically IGCC technology—as a key technology for reducing the environmental impact of coal-based electricity generation, and which may be advantageous for CO_2 capture. The gasification process chemically decomposes the fuel before its combustion to provide a stream of CO_2 for separation and storage, as well as a stream of hydrogen for electricity production. It is advantageous in facilitating CO_2 capture because it provides a more concentrated stream of CO_2 at high pressure for separation and reduces the energy required for additional compression of the CO_2 for transport. DOE also indicates that IGCC plants may enable near-zero emissions of pollutants, including sulfur dioxide, nitrogen oxides, and particulate emissions, as well as increase fuel efficiency.

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[16] Howard Herzog and Dan Golomb, "Carbon Capture and Storage from Fossil Fuel Use," *Encyclopedia of Energy*, 2004.

While capturing CO_2 at IGCC plants would impose additional costs, assessments by DOE and international organizations concluded that these costs would be lower than they would be for pulverized coal-fired power plants that remove the CO_2 after fuel combustion. For example, a 2007 DOE study concluded that IGCC plants—if built initially with the capability to capture CO_2 emissions—had a lower adverse impact on efficiency and cost of electricity production than equipping a new pulverized coal-fired power plant and, therefore, were a less expensive option for capturing CO_2 emissions.[17] DOE officials told us that, based on the agency's analysis, the cost of electricity production would increase by 35 percent for newly constructed IGCC plants with CO_2 capture, compared to a 77 percent increase for newly constructed pulverized coal power plants equipped with CO_2 capture.[18] Figure 3 illustrates several of the key differences between the two capture approaches.

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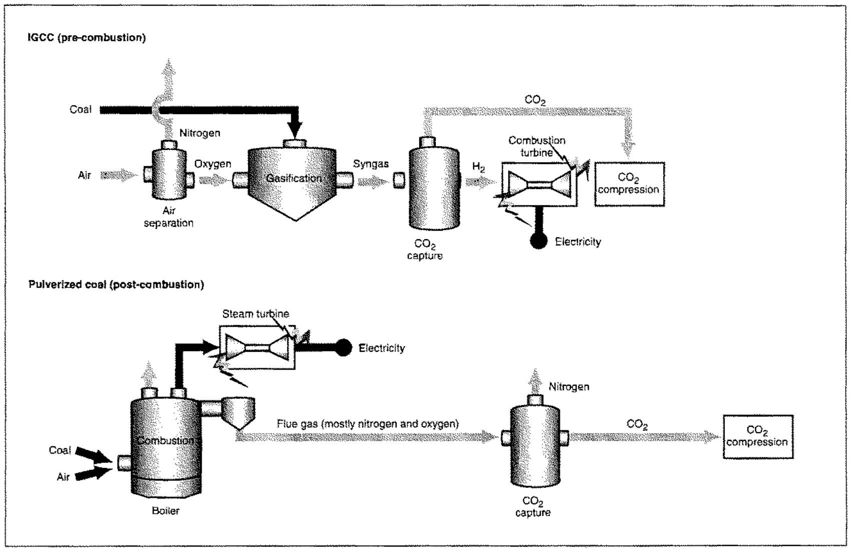
[17] Department of Energy, National Energy Technology Laboratory, *Cost and Performance Baseline for Fossil Energy Plants—Volume 1: Bituminous Coal and Natural Gas to Electricity, Final Report* (2007).

[18] DOE officials told us these estimates were based on *Cost and Performance Baseline for Fossil Energy Power Plants—Volume 1.*

Figure 3: Pre-combustion (i.e., IGCC) versus Post-combustion (i.e., pulverized coal) CO_2 Capture



Source: GAO analysis of IPCC and DOE data.

Nonetheless, while IGCC plants using CCS technology have been planned in a number of countries, the outlook for IGCC power plants remains uncertain. Among the factors impeding deployment of the technology are the following:

- *Cost of constructing IGCC power plants.* Recent assessments indicate that it may be initially more expensive to build a new IGCC power plant than to build a pulverized coal power plant if CO_2 emissions are not captured. The IEA notes, in particular, that the investment cost for an

IGCC plant is about 20 percent higher than for a pulverized coal combustion plant.[19] Moreover, the DOE *Cost and Performance Baseline for Fossil Energy Plants* report states that if the power plant does not capture CO_2 emissions, both the total cost of the plant as well as cost of electricity production would be more expensive at the IGCC power plants.[20] Furthermore, the IEA notes considerable uncertainty in IGCC costs because no coal-fired IGCC plants have recently been built.

- *Reliability concerns with IGCC plants.* Several stakeholders we interviewed expressed concern about the reliability of IGCC plants for electricity production. One electric power company official said that existing turbines for IGCC power plants are not reliable enough to provide base-load power for customers at high levels of CO_2 capture. Moreover, according to an MIT study, several IGCC power plants experienced reliability challenges in the first few years of operation, although many of these early problems proved manageable and the reliability of the plants subsequently improved.[21] However, the National Coal Council identifies reliability as one continuing area of concern in which IGCC technology could be improved.[22]

- *Challenges in building new coal-fired power plants in the United States.* Using IGCC as an enabling technology for CCS is premised on building new coal-fired power plants. However, efforts to build new coal-fired power plants, regardless of the technology used, are facing increased regulatory scrutiny due to environmental concerns. A 2008 DOE report, *Tracking New Coal-Fired Power Plants,* states that significantly fewer new U.S. coal-fired power plants have been built than originally planned. Delays and cancellations have been attributed to regulatory uncertainty, including climate change concerns and escalating costs.

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[19] International Energy Agency, *Energy Technology Perspectives 2008: Scenarios and Strategies to 2050* (Paris, 2008).

[20] DOE officials told us that the study was based on current technology and not on possible advanced technology being developed.

[21] MIT, *The Future of Coal* (2007).

[22] The National Coal Council, *Technologies to Reduce or Capture and Store Carbon Dioxide Emissions.*

Capturing CO_2 from Existing Coal-fired Power Plants Requires Significant Amounts of Energy and Imposes High Costs

Key assessments indicate that post-combustion capture of CO_2, which would be used at pulverized coal power plants, faces significant technical challenges that greatly affect the cost and feasibility of its deployment using currently available technology.[23] This is significant because these pulverized coal facilities account for an overwhelming share of the world's coal-fired capacity.

In a pulverized coal plant, coal is burned with air in the boiler to produce steam. The steam then drives a turbine to generate electricity. Hence, CO_2 would have to be separated from the boiler exhaust, or flue gas, after combustion, rather than separating the carbon before combustion, as is the case in an IGCC plant. The need to separate CO_2 from the flue gas adds a number of technical challenges that can affect the cost and efficiency of CO_2 capture:

- *Treating large volumes of flue gas to remove CO_2.* As noted earlier, large volumes of flue gas must be treated to remove dilute concentrations of CO_2. DOE estimates that CO_2 accounts for only about 15 percent of the volume of the flue gas from a pulverized coal-fired power plant, compared to about 40 percent in an IGCC plant.
- *Removing impurities from the flue gas before CO_2 removal.* Trace impurities in the flue gas, such as particulate matter, sulfur dioxide, and nitrogen oxides, can reduce the effectiveness of certain CO_2 capture processes. The IPCC notes that it is important to reduce the acidic gas components, which would reduce the absorption capacity of the solvent used to remove CO_2. Additionally, IPCC notes that fly ash and soot present in the flue gas could be problematic, if not addressed.
- *Compressing the captured or separated CO_2.* Compressing captured or separated CO_2 from atmospheric pressure to pipeline pressure represents a large auxiliary power load on the overall plant system. The MIT study indicated that the energy required to compress the CO_2 is the second largest factor in reducing the efficiency of the power plant.[24]
- *Significant cost increases in retrofitting CCS to an existing plant.* An IPCC assessment of several studies concluded that retrofitting a CO_2 capture system to existing coal-fired power plants would increase the

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[23] Nearly all existing coal-fired power plants are pulverized coal power plants.

[24] MIT, *The Future of Coal.*

incremental cost of producing electricity from about 150 to 290 percent. Similarly, based on a study of a representative coal-fired plant in Ohio, DOE estimated that capturing 30 percent of a retrofitted plant's CO_2 emissions would increase its cost of electricity production by 2.3 cents per kilowatt-hour, while capturing 90 percent of the plant's CO_2 emissions would increase the cost of producing electricity by nearly 7 cents per kilowatt-hour.[25] For comparative purposes, the DOE's Energy Information Administration reports that the average retail price of electricity in the United States is 8.9 cents per kilowatt hour.

Regulatory and Legal Uncertainties Also Complicate Capture, Injection, and Storage of CO_2

The IPCC, two federal advisory committee reports, and many stakeholders we contacted agreed that key regulatory and legal issues will need to be addressed if CCS is to be deployed at commercial scale. Among these issues are (1) confusion over the rules for injecting large volumes of CO_2, (2) long-term liability issues concerning CO_2 storage and potential leakage, (3) how property ownership patterns may affect CO_2 storage, and (4) how the Clean Air Act will apply to facilities that capture CO_2.

Confusion over Rules about Large-Volume Injections of CO_2

Electric utilities and oil and gas companies have underscored the need for guidance on how CCS projects that inject large volumes of CO_2 would be regulated under EPA's Underground Injection Control (UIC) program, which is designed to protect underground sources of drinking water. As noted earlier, under the UIC program, EPA regulates underground injections of various substances, including nonhazardous and hazardous wastes into more than 800,000 injection wells. The SDWA requires EPA to develop minimum federal requirements for injection practices that protect public health by preventing injection wells from endangering underground sources of drinking water. However, the injection of CO_2 for long-term storage raises a new set of unique issues related to its relative buoyancy, its corrosiveness in the presence of water, and large volumes in which it would be injected.

Stakeholders suggested that the absence of regulations related to large-volume CO_2 injection and storage was creating considerable uncertainty for CCS projects. Recently, EPA proposed a regulation to address this uncertainty. Prior to this proposal, nearly half of the 20 stakeholders we interviewed said uncertainty regarding CO_2 injection and storage regulations was a large or very large barrier to CCS deployment. For example, one industry stakeholder said that he was uncertain about whether injecting CO_2 in large volumes was actually legal, since EPA's guidance to date only addresses pilot CCS projects. Other stakeholders have mentioned that without new EPA guidance on large volume CO_2 injections, they were uncertain about how stringent their well construction and monitoring needed to be. In addition, a diverse panel at EPA's 2007 UIC workshop on the issue noted that well spacing could be a significant issue that needed to be addressed, since the pressure effects caused by various CO_2 injections could intersect and have a major impact due to injection volumes, particularly with the size and potential number of CO_2 projects. Finally, according to a 2007 report by the American Public Power Association, the uncertainty associated with UIC permit requirements has complicated commercial scale planning for new coal-fired power plants because it has left utilities uncertain as to whether they could inject CO_2 locally or be required to pipe CO_2 over great distances.

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[25] Department of Energy, National Energy Technology Laboratory, *Carbon Dioxide Capture from Existing Coal-Fired Power Plants* (2007).

In July 2008, EPA addressed some of these technical and regulatory issues in its proposed rule for underground injection of CO_2 for geologic sequestration. Preliminary stakeholder reaction to EPA's proposed rule, discussed later in this report, suggests that some CO_2 injection-related uncertainties may be headed for resolution through the EPA rulemaking but that others will be more challenging to resolve.

Long-Term Liability Concerns over CO_2 Storage and Possible Leakage

Beyond the immediate concerns over how to inject large volumes of CO_2, stakeholders expressed broader concerns over the long-term liability associated with its storage. They pointed specifically to a lack of clarity regarding who—the injector or the property owner—will ultimately be responsible for CO_2 injections and storage after the wells are capped. If stored CO_2 migrated beyond the area in which it was intended to be stored, there are two potential outcomes that generate concern:

- Stored CO_2 could migrate underground and endanger underground sources of drinking water, leading to liability under the SDWA for the party responsible. According to EPA, CO_2 migration into drinking water can cause the leaching of contaminants, such as arsenic, lead, and other compounds, into the water. CO_2 migration could also result in changes in regional groundwater flow and the movement of saltier fluids into drinking water, causing its quality to degrade. As the July 2008 proposed rule's preamble reiterates, under the SDWA, well operators remain responsible indefinitely for any migration that endangers underground sources of drinking water, and courts could impose civil penalties as high as $25,000 per day. Participants in EPA's 2007 UIC workshop raised the prospect of environmental and health concerns posed by CO_2 injections, including the mobilization of previously isolated metals, lower pH as a result of CO_2 interaction with water, and saltwater displacement.

- Stored CO_2 could also migrate beneath adjacent lands. If CO_2 was injected for geologic storage and it migrated underground into neighboring mineral deposits, for example, it could interfere with the adjacent mineral owners' abilities to extract those resources, and the injection well's operator could be held liable for nuisance, trespass, or another tort.

EPA's 2007 UIC workshop, attended by more than 200 stakeholders, revealed liability associated with unintended migration of injected CO_2 to be a critical concern. Similarly, 19 of the 20 stakeholders we interviewed told us that liability related to CO_2 storage was a large or very large barrier to deployment of CCS at commercial scale, with some noting that liability concerns have already negatively impacted companies' ability to initiate CCS projects. For example, two stakeholders reported that these concerns have already made it difficult to obtain insurance for CCS projects. They noted specifically that insurers have difficulty writing insurance policies because of the uncertainties associated with and limited data available for CCS, while another added that investors will not support projects like CCS if they expose them to unlimited and undefined long-term liabilities, especially when future revenue streams are uncertain.

Property Ownership Patterns May Also Affect CO_2 Storage

Setting aside any complications that could later arise from CO_2 leakage onto others' property, electric utilities and other stakeholders note that at the outset of a CCS project, it would be essential to identify and obtain the consent of all surface and mineral property rights owners. Such a determination is not always straightforward because ownership of surface land is often severed from ownership of minerals located below the land's surface and, in the same vein, ownership of saline reservoirs. In these circumstances of severed ownership, state law varies on who owns the geologic formation or potential storage site that would sequester the CO_2. In some states, the surface landowner owns the geological formation, but in others, the mineral rights owner owns the formation. Moreover, those geologic formations used for CO_2 storage that extend below surface lands could encompass the mineral rights of multiple owners.

Aside from the question of who owns the storage site, it is also not clear who would actually own the CO_2 once injected—the injector, the owner of the surface land, or the owner of the subsurface geologic formation—because few state laws or courts have yet to address the issue. Some state laws and courts, however, have recognized that injectors of natural gas retain ownership of that gas.

Multiple stakeholders told us that this issue will be a much larger one as CCS projects are scaled up to commercial scale and move beyond existing enhanced oil recovery projects that inject smaller volumes of CO_2 in order to extract additional oil from underground reservoirs. They noted that the CO_2 plume, or pressure front created by injecting the CO_2 underground, can cover tens to hundreds of square miles, affecting numerous property owners. According to one power company official, this property rights issue is different from liability-related issues, since it could prevent CO_2 from being injected into the ground in the first place. If they cannot get access rights to the formation, they cannot do a project.

Uncertainty Regarding How the Clean Air Act Will Apply to Power Plants with CCS

According to EPA air officials, the Clean Air Act's New Source Review (NSR) requirements apply to new power plants that are constructed with carbon capture technology and may apply to existing power plants that install the technology. NSR is triggered when a new facility is built, or when an existing facility makes a major modification, a physical or operational change that would result in a significant net increase in emissions. Under NSR, permitting authorities review the proposed facility or modification to establish emission limits and ensure the requisite pollution control technologies will be used before granting it a permit. Because of the additional energy required for carbon capture, EPA officials note that power plants implementing the technology might need to burn more coal to generate the same amount of electricity. If this increased coal usage resulted in a significant net increase of emissions of pollutants regulated under the act, such as ozone or sulfur oxide, NSR could be triggered.

Some note that the NSR requirements, and the additional costs and uncertainties associated with them, may discourage facilities such as power plants from adopting CCS technology. For example, a recent report from a federal advisory committee to the Secretary of Energy states that "for existing coal-fired facilities, a major question is whether the Clean Air Act, including the NSR requirements of the Act, would apply if CCS equipment is installed."[26] Multiple stakeholders we interviewed agreed that adding CCS equipment to an existing power plant could raise problems under NSR. One noted, in particular, that NSR challenges were manageable while CCS projects were at the demonstration scale but could pose greater problems when CCS is deployed at a larger scale.

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[26] The National Coal Council, The Urgency of Sustainable Coal (Washington D.C., 2008).

The Absence of a National Strategy to Control CO_2 Emissions Gives Neither Industry Nor Government Agencies an Incentive to Invest in CCS

According to the IPCC, the National Academy of Sciences, and other knowledgeable authorities, another barrier is the absence of a national strategy to control CO_2 emissions (emissions trading plan, CO_2 emissions tax, or other mandatory control of CO_2 emissions), without which the electric utility industry has little incentive to capture and store its CO_2 emissions. Moreover, according to key agency officials, the absence of a national strategy to control CO_2 emissions has also deterred their agencies from resolving other important practical issues that will ultimately require resolution if CCS is to be deployed on a large scale. Such issues include lack of clarity regarding who owns injected CO_2 and how stored CO_2 will be addressed in a future emissions trading scheme.

Industry Has Little Incentive to Invest in CO_2 Control Technologies without a National Strategy to Control CO_2 Emissions

A wide range of academic, industry, and other knowledgeable authorities agree that CCS is unlikely to be used to any substantial extent without some kind of national strategy to control CO_2 emissions. The IPCC's 2005 report on CCS observed, for example, that "all models indicate that CCS systems are unlikely to be deployed on a large scale in the absence of an explicit policy that substantially limits greenhouse gas emissions to the atmosphere. With greenhouse gas emission limits imposed, many integrated assessments foresee the deployment of CCS systems on a large scale within a few decades from the start of any significant climate change mitigation regime." It stated further that "the stringency of future requirements for the control of greenhouse gas emissions and the expected costs of CCS systems will determine, to a large extent, the future deployment of CCS technologies relative to other greenhouse gas mitigation options."[27]

EPA's Clean Air Act Advisory Committee's Advanced Coal Technology Workgroup similarly reported that widespread commercial deployment of advanced clean coal technologies, including large-scale CCS, likely will not occur without legislation that establishes a significant long-term "market driver." The majority of stakeholders we interviewed agreed, characterizing the absence of a national strategy to control CO_2 emissions as a large or very large barrier to CCS deployment on a commercial scale, with many stating that without a price on emitting CO_2, there is no rationale for utilities or other facilities to control their emissions. Moreover, according to a leading researcher,[28] "in order for significant progress to be made in reducing greenhouse gas emissions, some form of mandatory emissions limits or tax on greenhouse gases will be required, just as in every other area of environmental regulation where substantial costs of emission reductions must be borne."

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[27] IPCC, IPCC Special Report on Carbon Dioxide Capture and Storage (2005).

[28] J.M. Antle, University Fellow, Resources for the Future, *Is There a Role for Geologic and Terrestrial Carbon Sequestration in Greenhouse Gas Mitigation?* (February 2008).

One indication as to how emitters might respond to a cost on CO_2 emissions was provided by a Norwegian petroleum company after Norway introduced a $40 per metric ton tax on offshore CO_2 emissions in 1991. The Statoil petroleum company's Sleipner project, a natural gas processing project located at a gas field 250 kilometers off the coast of Norway, had already been removing CO_2 from the natural gas to prepare it for sale on the open market. But with no financial incentive to do otherwise, Statoil had simply vented the CO_2 into the atmosphere. At least partly in response to the tax, however, the company, in 1996, began to capture approximately 3,000 metric tons of CO_2 per day from natural gas extraction and store it 800 meters under the North Sea's seabed in a geologic formation called a saline reservoir.

The United States' experience with other pollutants, notably sulfur dioxide (SO_2), also provides insights into the kind of market-based emissions control regime that could emerge if a national strategy to control CO_2 emissions was adopted. In Title IV of the Clean Air Act 1990 Amendments, Congress established a goal of reducing annual emissions of SO_2 by 10 million tons from 1980 emissions levels. Specifically, the law established overall emission limitations and allocated SO_2 emission allowances to individual electric utilities. The utilities are required to own enough allowances at the end of each year to cover their emissions. Under the law's allowance trading system, utilities can trade some or all their allowances in a way that allows them greater flexibility in achieving the required emission reductions at the lowest cost. In cases where utilities were able to reduce emissions below their required allowance, they were able to sell the extra allowances at the market price to other utilities. As with the SO_2 program, analyses by government and academic organizations generally indicate that CCS technology will be more extensively used as emission limits tighten.

An important lesson from the SO_2 program was that as vendors competed to meet utilities' emission reduction needs, they were prompted to seek the least expensive means of providing utilities with low-sulfur coal, "scrubbers," and other methods for reducing sulfur dioxide emissions.[29] As a result, the overall cost of reducing emissions decreased over time. More generally, a study commissioned by the IEA's Greenhouse Gas R&D Program emphasizes the decrease in costs of new technologies over time.[30] It suggests that for new coal emission control technologies, the initial higher plant costs incurred are gradually reduced through experience and from continued research and development.

The Absence of a National Strategy to Control CO_2 Emissions Has Constrained the Federal Government's Efforts to Plan For and Develop CCS Projects

The absence of a national strategy to control CO_2 emissions not only leaves the regulated community with little incentive to reduce their emissions, it also leaves regulators with little reason to devise the practical arrangements necessary to implement the reductions. For example, regulators have not addressed how utilities that capture and sequester CO_2 would be treated under a future emissions trading plan. The EU's early experience with CO_2 emissions trading illustrates the significance of including CCS in an emissions trading plan. EU officials told us when the Emissions Trading System (ETS) was conceived, the maturity of CCS as a technical reduction option for $CO_2$was not clear. Therefore, CCS projects were not systematically included in the ETS.[31] However, EU officials noted that the situation has changed substantially since then. Indeed, a recent European Commission report indicates that not systematically including CCS in the ETS may be one barrier to its deployment.[32] Accordingly, the European Commission is now proposing legislation to explicitly include, after 2012, facilities involved in the capture, transportation, and storage of CO_2 in the ETS. These facilities would then earn allowances for nonemitted CO_2 and would have to surrender emissions allowances for any leakages of CO_2 that occur. Consequently, EU officials told us that the proposed directive, when enacted, would remove this barrier.

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[29] GAO, *Air Pollution: Allowance Trading Offers an Opportunity to Reduce Emissions at Less Cost*, GAO/RCED-95-30 (Washington, D.C.: December 16, 1994) and *Air Pollution: Overview and Issues on Emissions Allowance Trading Programs*, GAO/RCED-97-183 (Washington, D.C.: July 9, 1997).

[30] Edward S. Rubin et al, "Use of Experience Curves to Estimate Future Cost of Power Plants with CO_2 Capture," *International Journal of Greenhouse Gas Control*, vol. 1, issue 2 (2007).

[31] EU member states can seek to include CCS projects in their national emission cap by gaining approval from the European Commission on a case-by-case basis.

[32] EU Commission Staff Working Document, accompanying document to *the Proposal for a Directive of the European Parliament and of the Council on the Geologic Storage of Carbon Dioxide* (January 23, 2008).

Likewise, cognizant agency officials responsible for U.S. programs have told us that they will not act on key CCS implementation issues prior to Congress establishing a national strategy to control CO_2 emissions. For example, as noted earlier, the officials told us that uncertainty regarding property rights ownership stems from ambiguity over who owns the injected CO_2, and it is similarly unclear what the government's potential liability might be for long-term storage of CO_2 on federal lands. Bureau of Land Management (BLM) officials said they are aware of the issue and of the BLM's jurisdiction in the matter but told us they are looking to Congress for a solution before they will take any specific actions to address it. These officials also noted that while they do have authority to permit CO_2 injections on federal lands that are solely for sequestration purposes, they are uncertain whether BLM has statutory authority to establish a funding mechanism for long-term management of sequestration sites on federal lands.

Other practical issues requiring resolution, which cross the jurisdictions of a range of federal agencies and of state and local governments, are discussed later in this report.

Federal Agencies Have Yet to Resolve the Full Range of Issues Requiring Resolution for Widespread CCS Deployment

While federal agencies have begun to address CCS barriers, they have yet to comprehensively address the full range of issues that would require resolution for widespread CCS deployment. DOE has achieved limited results in lowering the cost of CO_2 capture at existing power plants, and the agency's focus on gasification technology to date may not provide for the needed reductions in emissions because few facilities with this technology currently exist. However, DOE's focus has recently shifted to better balance the need for capture technology at both new and existing power plants. EPA has recently issued a proposed rule that clarifies significant regulatory uncertainties related to CO_2 injection and storage. However, critical questions remain about long-term liability for stored CO_2. Elsewhere in the federal government, agencies have not addressed a number of issues that could delay CCS deployment. Among them are how CO_2 pipeline infrastructure might be developed and how a future emissions trading plan would treat avoided CO_2 emissions due to CCS.

DOE Has Only Recently Prioritized Research to Help Control CO_2 Emissions from Existing Power Plants

DOE has identified IGCC technology as the key enabling technology for reducing CO_2 emissions from newly constructed coal-fired power plants and has helped to develop and demonstrate IGCC technology. However, key assessments by the National Academy of Sciences and international organizations have raised questions about how the agency's focus on IGCC technology may have affected the broader effort to substantially reduce CO_2 emissions from coal-based electricity generation because (1) as noted earlier, the outlook for widespread deployment of IGCC technology is questionable and (2) the agency's funding related to IGCC technology has substantially exceeded funding for technologies more applicable to reducing emissions from existing coal-fired power plants. DOE has recently started to focus greater attention on technologies more applicable to reducing emissions from existing power plants.

DOE Has Achieved Some Advances with IGCC Technology

Consistent with DOE's emphasis on IGCC, the agency cites a number of accomplishments in advancing the technology, such as its support for two operational IGCC power plants, in Florida and Indiana, that produce substantial amounts of electricity, while also demonstrating the production of high-pressure syngas amenable to CO_2 capture.[33] DOE also cites its contributions to the development of several IGCC-related technologies, which would advance pre-combustion CO_2 capture. Specifically, recent technological advances cited by the agency include successful fabrication and testing of a liquid membrane that is stable at high temperatures and that could be used for CO_2 capture in IGCC plants, as well as a new material with CO_2 separation potential for gas separation. Moreover, according to a published journal article with three DOE co-authors, advances in membranes may be significant in advancing CO_2 capture because membranes are less energy intensive, compared to other separation techniques.[34] Taken together, the National Academy of Sciences credits DOE's efforts in promoting IGCC technology, citing the agency's efforts to develop "a close working relationship with the industry to move the technology through the commercial demonstration stage."[35]

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[33] Syngas is the gas produced by the gasification process, composed of hydrogen, carbon monoxide, and minor amounts of other constituents. While DOE considers the gas stream amenable to CO_2 recovery, CO_2 capture was not actually demonstrated in the projects.

[34] Jose D. Figueroa, Timothy Fout, Sean Plasynski, Howard McIlvried, and Rameshwar D. Srivastava, "Advances in CO_2 capture technology- The U.S. Department of Energy's Carbon Sequestration Program," *International Journal of Greenhouse Gas Control*, vol. 2 (2008).

Looking ahead, DOE hopes to make further investments, and progress, in demonstrating IGCC's feasibility to capture CO_2 through its FutureGen program, which aims to accelerate commercial deployment of IGCC or other advanced clean coal-based power generation technology with CCS. Moreover, under the restructured FutureGen program, DOE anticipates supporting demonstrations at more than one site.

DOE Funding Decisions Reflect Agency's Focus on IGCC

DOE's progress, however, has required both significant time and resources. As the National Academy of Sciences noted, the development of an integrated IGCC system has been an important component of DOE's Fossil Energy Research Development and Demonstration program for more than 20 years, and between 1978 and 2000, DOE invested $2.3 billion in gasification technology.[36] Moreover, DOE budget data indicate that in more recent years, the agency has continued to provide substantial funding for IGCC technology. Several Fossil Energy programs provide substantial support for developing IGCC technology, including the IGCC program, the FutureGen program, and the advanced turbines program. Together, these programs account for a significant share of Fossil Energy's overall budget. The Carbon Sequestration program also provides some additional funding for CO_2 capture using IGCC technology.

Developing an exact estimate of DOE funding for IGCC technology is challenging because the individual DOE programs pursue multiple objectives and funding categories have changed over time. However, an examination of DOE's budget information suggests that its support from 1997 (the year the Carbon Sequestration program began) to present is likely on the order of hundreds of millions of dollars and probably in excess of $500 million. A DOE official within Fossil Energy acknowledged to us that "the bulk of coal program capture funding relates to gasification, particularly IGCC," although DOE officials said they are now focusing more attention on existing pulverized coal power plants.

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[35] National Research Council, National Academy of Sciences, *Energy Research at DOE: Was It Worth It? Energy Efficiency and Fossil Energy Research 1978 to 2000* (Washington, D.C., 2001).

[36] National Academy of Sciences, *Energy Research at DOE: Was It Worth It?*

IGCC Technology's Potential for Reducing CO_2 Emissions Is Uncertain

The payoff for this investment, however, will depend heavily on the extent to which IGCC technology is used in newly constructed power plants—both in the United States and worldwide. In this regard, the National Academy of Sciences said in a recent assessment that the Carbon Sequestration program "is taking on a relatively high overall risk to create technologies for commercial demonstration by 2012 in that it relies heavily on the successful deployment of full-scale IGCC plants." The report added that there are only a few IGCC plants operating worldwide and advanced, commercial-scale IGCC units are only in the design phase and have no CO_2 sequestration.[37]

Moreover, as noted earlier, studies by the IEA, DOE, and the National Coal Council cite a number of compelling factors, such as the relative cost of IGCC plant construction and the limited operational experience worldwide with this relatively new technology, which may limit commercial deployment of IGCC technology. Several industry stakeholders we interviewed expressed concerns about using IGCC technology for electricity generation, including the cost of constructing IGCC plants and possible reliability concerns. For example, officials from one electric power company told us they thought high levels of CO_2 capture at IGCC plants would necessitate the use of a turbine, which has not yet been commercially demonstrated. Looking ahead, the IEA's 2007 *World Energy Outlook* notes that "for IGCC to establish itself in the market, further development to bring down costs and improve operational flexibility is necessary."

DOE Has Thus Far Achieved Limited Success in Reducing CO_2 Emissions from Existing Power Plants

Until recently, DOE budget decisions reflected a view that IGCC technology offered greater potential to capture CO_2 than technologies applicable to pulverized coal-fired power plants. As indicated earlier, DOE budget information we reviewed indicates substantial funding for IGCC technology, likely in the order of hundreds of millions of dollars. By comparison, DOE support for post-combustion CO_2 capture technology, most applicable for existing plants, appears more limited, likely on the order of tens of millions of dollars.

As noted earlier, DOE has cited a number of challenges that complicate efforts to capture CO_2 emissions from pulverized coal-fired power plants, including the large volumes of gas that must be treated; trace impurities in the exhaust gas (such as particulate matter, sulfur dioxide, and nitrogen oxides) that can degrade the effectiveness of certain capture processes; and the high amount of energy needed to compress CO_2 emissions. Among other things, a DOE study concluded that if CO_2 capture were added to a pulverized coal-fired power plant that started operations in 2010, its cost of electricity production would increase by approximately 80 percent.[38]

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[37] National Research Council, National Academy of Sciences, *Prospective Evaluation of Applied Energy Research and Development at DOE (Phase Two)* (Washington, D.C., 2007).

These technological realities, however, are at odds with another reality anticipated by a number of organizations: these facilities will account for the vast majority of coal capacity in the United States and around the world in the near term. Accordingly, in past years, the agency has undertaken some initiatives to advance technologies to capture CO_2 from these facilities and points to a number of accomplishments arising from these efforts. Among them, DOE researchers reported patenting a technique to capture CO_2 from a coal-fired power plant's exhaust using ammonia, a technique planned for two capture demonstrations at power plants in Ohio and North Dakota. DOE officials also point to several other projects related to post-combustion CO_2 capture, including development of ionic liquids with greater absorption capacity for CO_2 and development of sorbent technology for retrofitting existing pulverized coal plants. DOE officials also pointed to investments in two other challenging aspects of CO_2 capture. One involves research to address one of the largest cost drivers, the cost of regenerating the absorbent. DOE officials also pointed to work on technologies to improve the efficiency of compressing CO_2, a major cost factor in capturing CO_2 at these facilities.

Nonetheless, DOE's own analysis raises questions concerning the agency's progress in helping to reduce the cost of CO_2 capture at pulverized coal power plants. For post-combustion CO_2 capture, DOE officials indicated to us that the agency's current goal is to develop, by 2012, pilot-scale systems to capture 90 percent of CO_2 at no more than a 35 percent increase in the cost of electricity production. However, it is noteworthy that this goal is to develop pilot-scale systems only; commercial-scale units will not come online until the 2020 time frame.

An assessment report recently published by DOE indicates the size of the challenge DOE faces in reducing the cost of capture. The study indicated that CO_2 capture would increase the cost of electricity production by 77 percent at a pulverized coal power plant starting operation in 2010.[39] A DOE official within Fossil Energy acknowledged to us that owners of existing pulverized coal power plants, under a future emissions trading arrangement, might choose to purchase carbon allowances, rather than pay for an expensive retrofit, and that plant age and other economic considerations will make the determination of whether a retrofit or another action, such as purchasing allowances, will occur.

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[38] DOE, *Cost and Performance Baseline for Fossil Energy Plants—Volume 1.*

One contributing factor to DOE's limited progress in reducing CO_2 emissions from existing power plants is that it is a relatively lower priority for DOE. The National Academy of Sciences noted that the Carbon Sequestration program has focused on IGCC technology to achieve its goal of reducing the cost of carbon capture.[40] Our examination of DOE's budget in recent years supports this view:

- *The Carbon Sequestration program has provided limited capture funding*: DOE officials estimated the Carbon Sequestration program provided approximately $50 million in funding related to all types of CO_2 capture from fiscal year 2002 to fiscal year 2007. While DOE officials were able to provide limited information quantifying precisely how this funding was split between post-combustion and pre-combustion capture, they indicated that the majority of it went toward the development of post-combustion and oxy-combustion capture technologies. DOE officials suggest that, historically, 20 percent of the Carbon Sequestration program's budget has gone toward capture, which DOE officials said allowed capture technology development to continue as DOE evaluated geologic storage of CO_2. However, capture-related funding has generally received less funding in the Carbon Sequestration program's budget than other areas, such as the regional partnerships.
- *Post-combustion capture has not been supported by related programs*: Until recently, post-combustion CO_2 capture had not received large amounts of funding from other programs in Fossil Energy. Specifically, until fiscal year 2008, no other major Fossil Energy programs provided substantial funding related to post-combustion capture, in contrast to those programs' support for IGCC technology.

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[39] DOE, *Cost and Performance Baseline for Fossil Energy Power Plants—Volume 1.*

[40] National Academy of Sciences, *Prospective Evaluation.*

DOE Has Recently Focused More Attention on Existing Plants

Looking ahead, DOE officials told us that the agency is now focusing more attention on reducing CO_2 emissions from existing plants by shifting the focus of a related Fossil Energy program, the Innovations for Existing Plants program, so that it emphasizes the development of post-combustion capture of CO_2. Among the factors cited in this decision were (1) the large number of pulverized coal power plants in the United States; (2) congressional direction in the report accompanying the agency's fiscal year 2008 appropriation to focus more attention on this issue; and (3) the applicability of advances in this area to the large number of pulverized coal power plants under construction in China and India.

In February 2008, DOE announced that it was soliciting applications for projects "specifically focused on developing technologies for CO_2 capture and separation that can be retrofitted to existing pulverized coal (PC) power plants." In July 2008, the agency announced it was providing $36 million in funding for 15 projects to develop new and cost-effective capture technologies for existing power plants.

Other recent changes in DOE's funding decisions also appear to recognize the significance of reducing emissions from existing power plants:

- The Carbon Sequestration program's funding for post-combustion CO_2 capture (including oxyfuel combustion capture) increased from $10.1 million in fiscal year 2007 to $15.4 million in fiscal year 2008.
- The network of Regional Carbon Sequestration Partnerships appears to be placing more emphasis on demonstrations of CO_2 capture at coal power plants for an upcoming series of large-scale sequestration projects. Specifically, a DOE official identified three projects being planned to capture CO_2 from coal-fired power plants, including possibly capturing 500,000 tons of CO_2 from a coal-fired power plant in North Dakota.
- DOE indicated in an August 2008 announcement that the agency's Clean Coal Power Initiative program would support coal-based technologies to capture and sequester CO_2 emissions. For post-combustion CO_2 capture, the announcement indicated that advanced technologies are sought to reduce the cost and additional power load of CO_2 capture.

While it seems too early to evaluate the results of DOE's increased focus on post-combustion CO_2 capture, key organizations' assessments appear supportive of this shift. A 2008 National Coal Council report, for example, identifies retrofitting existing coal power plants with CCS as part of a larger approach to reducing emissions.[41] In the same vein, the IPCC notes that the strategic importance of post-combustion capture systems becomes evident when one considers the large amount of emissions from pulverized coal power plants.

EPA Has Begun to Address Regulatory Uncertainty Concerning CO_2 Injection and Storage, but Key Issues Remain Unresolved

As discussed earlier in this report, CCS stakeholders have stated that the absence of regulations governing large-volume CO_2 injection and storage had created considerable uncertainty about the projects and risks associated with CCS. In an effort to address many of these concerns, EPA issued a proposed a rule in July 2008 to address permitting and other requirements for injection of CO_2 for geologic sequestration. The proposed rule, issued under the agency's SDWA authority, clarifies a number of practical issues for prospective well owners and operators concerning CO_2 injection and identifies certain requirements governing their financial responsibilities, including for the period after the CO_2 is injected and the well is closed. However, as EPA officials note, the rulemaking was not intended to resolve many questions concerning how other environmental statutes may apply to captured and injected CO_2, including the Clean Air Act, CERLCA, and RCRA. A number of key issues, therefore, have yet to be addressed.

EPA Has Issued a Proposed Rule under the SDWA on Permitting Large-Volume CO_2 Injections

EPA's July 2008 proposed rule creates a new "Class VI" well type for injection of CO_2 for geologic sequestration. In doing so, it clarifies a number of issues relating to the more immediate, practical issues regarding CO_2 injection for geological storage. However, some notable ambiguities remain, particularly in the area of longer-term financial responsibility requirements. The following summarizes both the issues that have been addressed and those which may still need to be clarified. In the discussion below, we provide the preliminary views of the stakeholders we interviewed. It is important to note, however, that the proposed rule's 120-day comment period runs until November 24, 2008, during which time EPA will obtain a broader array of public advice and opinions on its proposed rule.

Site characterization, well construction, and monitoring requirements. The proposed rule specifies a number of requirements concerning the location of the CO_2 injection well, including (1) the criteria for characterizing the site of the geologic formation and (2) requirements for reviewing the wider geographic area surrounding the storage site prior to injection. Regarding site characterization, the well owner or operator must demonstrate that the well will be located in an area with a suitable geologic system, including a confining zone for the injected CO_2 that is free of faults or fractures, that would contain the CO_2. The proposed rule also specifies that injection of CO_2 above the lowermost formation containing an underground source of drinking water is prohibited. Regarding the wider geographic area surrounding the storage site that may be impacted by the injection, it requires well owners and operators to delineate an Area of Review (AoR) within which the owner or operator must identify all penetrations, such as wells, that may penetrate the confining zone and determine whether the wells have been plugged in a manner that prevents the movement of CO_2 or associated fluids that may endanger underground sources of drinking water.

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[41] The National Coal Council, *The Urgency of Sustainable Coal.*

The proposed rule also includes standards for well construction, operation, and monitoring. For example, although EPA does not specify which materials must be used, the proposed rule does require the use of materials that meet or exceed industry standards, that are compatible with injected CO_2, and that are designed for the life of the well. The proposed rule also contains an injection pressure limitation so that an injection does not create new fractures or cause movement of injected CO_2 that endangers underground sources of drinking water. It requires continuous monitoring of injection pressure, rate, and volume, and requires semiannual reporting of this data to EPA. The proposed rule also requires well owners and operators to submit, with their permit application, a testing and monitoring plan to verify that the CO_2 storage project is operating as permitted and is not endangering underground sources of drinking water.

The proposed rule also addresses stakeholder concerns about how current CO_2 injection wells operating as Class I industrial wells, Class II injection wells that use CO_2 for enhanced oil or natural gas extraction, and Class V experimental CO_2 injection wells would be regulated if they transition to use for long-term storage. It specifies that owners of these existing wells may apply for the new Class VI permit and that the UIC program director would have the discretion to grandfather the well's pre-existing construction requirements if the director determined that doing so would not endanger underground sources of drinking water. With this exception, the project would have to meet all other Class VI requirements in order to obtain a Class VI permit.

Financial responsibility requirements. EPA's proposed rule specifies that well owners and operators must demonstrate and maintain financial responsibility for corrective action (that is, repairs or other actions necessary to assure that wells within the AoR do not serve as conduits for the movement of fluids into underground sources of drinking water), well plugging, post-injection site care for a period of 50 years following cessation of injections, site closure, and emergency and remedial response. The UIC program director can adjust the 50-year time period for post-injection site care depending on whether the project poses an endangerment to underground sources of drinking water. If the UIC program director chooses to lengthen the post-injection site care time period, the owner and operator must continue to demonstrate financial responsibility until the end of that period. Although the financial responsibility demonstration requirement ends when the post-injection site care time period does, the proposed rule's preamble indicates that well operators remain responsible indefinitely for any endangerment of underground sources of drinking water.

In addition to clarifying well site care, the proposed rule also requires that well owners and operators periodically update their cost estimate for corrective action, well plugging, post-injection site care and site closure, and emergency and remedial response, and that they redemonstrate financial responsibility for these increased costs as the UIC program director deems necessary. It also requires well owners and operators to notify the UIC program director of any adverse financial conditions they encounter, such as bankruptcy.

While stakeholders acknowledge EPA's progress in clarifying some key financial responsibility requirements, they cite several other concerns:

- Although EPA's proposed rule establishes a post-injection site care period, it does not include a provision allowing well operators to be released from liability for endangerment of underground sources of drinking water during the hundreds of years that CO_2 will be stored in a geologic storage project. While it is beyond EPA's authority to release injection well owners and operators from liability, a discussion of long-term liability is included in the proposed rule's docket. Stakeholders told us that they were concerned by the unspecified period of time for which they may be liable for stored CO_2.
- The proposed rule only specifies a duty to demonstrate financial responsibility, stating that guidance will be developed at a later date describing the types of financial mechanisms that owners or operators can

use. Currently, financial responsibility for other well classes is demonstrated through third-party instruments, such as a surety bond that establishes a trust fund, or self-insurance instruments, such as a corporate financial test. However, EPA's existing financial responsibility requirements have been criticized as inadequate and the agency is currently reviewing its approach. EPA is evaluating whether to revise its financial responsibility guidance in light of these criticisms and is seeking public comments on various financial responsibility topics. Moreover, EPA officials told us that the Miscellaneous Receipts Statute limits the financial responsibility regulations because it prevents EPA from requiring a cash deposit or receiving money as a trustee.[42] The proposed rule's preamble also notes that EPA does not have the statutory authority to transfer financial responsibility from the well owner or operator to a third party.

Finally, there is some question as to whether EPA will have sufficient resources to implement the expanded UIC program. EPA has not examined the level of resources that will be needed to administer the UIC program once commercial-scale deployment of CCS occurs. However, a 2007 report by DOE's Argonne National Laboratory did examine the issue and concluded that if CO_2 were stored in large enough volumes to have a meaningful impact on global warming, it is likely that thousands or tens of thousands of injection wells would need to be developed and permitted in the United States. The report noted that this would require that state and regional UIC programs expand their staff and capabilities. In this connection, it observed that the annual national budget for the UIC program—approximately $11 million—has remained static for many years, even as UIC agencies have been asked to take on additional responsibilities. It warned that failure to provide sufficient resources would likely create permitting backlogs, resulting in a bottleneck in the overall carbon sequestration effort.

Multiple stakeholders agreed that EPA needs additional resources for the UIC program, including permit writers. One industry representative expressed concern that it can take up to 2 years to obtain a permit for a well under EPA's UIC program, and that if CCS projects become more widespread, EPA will be responsible for permitting thousands of additional injection wells.

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[42] 31 U.S.C. § 3302(b).

Key Legal and Regulatory Issues outside of the SDWA Have Been Largely Unaddressed

While EPA has addressed at least some of the legal and regulatory issues on how CO_2 injectors are to protect underground sources of drinking water, it has thus far not resolved a number of key environmental issues that fall under the jurisdiction of other statutes, including the Clean Air Act, RCRA, and CERCLA.

Clean Air Act. As noted earlier, the Clean Air Act's New Source Review (NSR) requirements could be triggered if an existing facility's installation of capture technology makes a major modification that significantly increases emission of regulated pollutants. EPA officials acknowledge concerns that NSR could cause delays and impose added costs to CCS projects. However, they said that an assessment of how NSR might impact the feasibility of CCS projects cannot be made globally because it depends on site-specific factors, such as geological and hydrological considerations, the CCS technology that will be used, how it will operate, and how that operation could affect the rest of the plant.

Laws governing hazardous wastes and substances. RCRA and CERCLA could pose similar complications for CCS projects. RCRA authorizes EPA to establish regulations governing the treatment, storage, and disposal of hazardous waste. A hazardous waste is generally defined as a solid waste that either (1) exhibits certain characteristics (ignitability, corrosivity, reactivity, or toxicity) or (2) has been listed as a hazardous waste by EPA. CERCLA established the Superfund program to clean up sites that have been contaminated by hazardous substances. CERCLA authorizes EPA to compel the parties statutorily responsible for the hazardous substances to bear the costs of cleaning up the contaminated site or to carry out cleanups itself and recover costs from the responsible parties. Hazardous substances are those which may present substantial danger to the public health, welfare, or environment when released and include all hazardous wastes subject to RCRA.

Whether any given injected CO_2 stream is categorically a hazardous waste or hazardous substance has not been resolved by EPA. The preamble to EPA's proposed rule notes that pure CO_2 in and of itself is not listed as a hazardous substance under CERCLA. However, the rule's preamble cautions that injected CO_2 streams could contain hazardous constituents that would make these streams "hazardous."[43] It notes that since the chemical composition of individual injected CO_2 streams vary, no categorical determination can be made as to whether all injected CO_2 streams are hazardous wastes. Accordingly, the preamble says that it will be up to the well owners and operators to make this determination on the basis of their particular circumstances. EPA officials said that they lacked the information about the composition of CO_2 streams captured from coal-fired power plants necessary to determine whether those streams should categorically be listed as a hazardous waste under RCRA.

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[43] The proposed rule's preamble notes that if a CO_2 stream contains hazardous waste as a constituent, it must be permitted as a Class I well. Class I wells are intended for hazardous materials.

Thus, considerable uncertainties over how owners and operators of CCS projects would be treated under key environmental laws other than the SDWA remain unresolved. An EPA federal advisory committee working group had emphasized, in particular, that the EPA address the liability implications concerning CO_2 injection under RCRA and CERCLA.[44] However, the proposed rule is unclear as to whether the two laws even apply to injected CO_2, and it is therefore uncertain whether injectors will be subject to hazardous waste disposal requirements and liability for hazardous substance releases.

Other Key Issues That Should Be Proactively Addressed to Support a National CCS Framework

In addition to the technical and legal issues affecting CCS's prospects, key studies, federal advisory committees, and the stakeholders we interviewed also identified an array of other issues that would need to be resolved if the technology is to be deployed within a time frame scientists believe is needed to address climate change. Moreover, whereas many of the technical and regulatory issues discussed earlier fall within the domain of two agencies (DOE and EPA), these other issues cross the jurisdictions of the Departments of the Interior and Transportation, the Federal Energy Regulatory Commission, and other agencies in a manner that would require collaboration between agencies and, in many cases, coordination with state governments and other entities.

Property Rights and Liability Issues Related to CO_2 Injection on Both Federal and Nonfederal Lands

Under a national CCS program, CO_2 could be sequestered on both federal and nonfederal lands and would raise complex property rights issues needing resolution in both instances. In the case of federal lands, BLM, which manages the federal government's mineral resources, is required by the Energy Independence and Security Act of 2007[45] to report by December 2008 on a framework to manage geological carbon sequestration activities on public lands. According to BLM officials, the report will include a discussion of the unresolved property ownership and liability issues related to long-term CO_2 storage. They note that the report will also discuss the statutory authority BLM currently has and what it lacks, such as the authority to establish a funding mechanism for monitoring and mitigation efforts associated with sequestration sites. They cautioned, however, that the report will not recommend solutions to current uncertainties and explained that since injected CO_2 can move onto adjacent private or state lands, resolving them will require collaboration with private landowners and state agencies.

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[44] Clean Air Act Advisory Committee Advanced Coal Technology Work Group, Final Report of the Advanced Coal Technology Work Group (Jan. 29, 2008).

Nationwide CO_2 sequestration would also pose major challenges on nonfederal lands. EPA notes that states with primacy for the UIC program have typically addressed such challenges when they have arisen under that program. The agency acknowledged the additional complications that would arise as stored CO_2 crossed state boundaries, but noted that such cross-jurisdictional issues typically occur under the UIC program and that states have worked together to address them. Nonetheless, the significantly larger scale of a future CCS program could magnify the problems posed by these jurisdictional issues. EPA officials noted that they are hoping that the proposed rule's comment process will surface ideas to address these problems. However, EPA officials also note that the agency lacks authority to issue regulations resolving these issues.

Furthermore, while EPA's proposed rule reaffirms liability related to underground sources of drinking water, ambiguity remains regarding who—the injector or the property owner— is ultimately responsible for unanticipated releases of the injected CO_2 that have other effects. As discussed earlier, the released CO_2 could interfere with the adjacent mineral owners' abilities to extract those resources, and the injection well's operator could be held liable for nuisance, trespass, or another tort.

CO_2 Pipeline Regulation

Pipelines are the preferred method of transporting large amounts of CO_2. The Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) administers safety regulations for CO_2 pipelines that affect interstate commerce and certifies states that have adopted regulations compatible with the minimum federal safety standards to regulate their intrastate pipelines. No federal agency has claimed jurisdiction over siting, rates, or terms of service for interstate CO_2 pipelines.[46] However, early assessments indicate that a nationwide CCS program could require a network of interstate CO_2 pipelines that would raise cross-jurisdictional issues and involve multiple regulatory authorities—all in the unprecedented context of a nationwide program to transport massive volumes of CO_2.

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[45] Pub. L. No. 110-140 (2007).

Neither the Federal Energy Regulatory Commission (FERC) or Surface Transportation Board (STB) currently regulate interstate CO_2 pipelines and have not developed any guidance for possible regulation because, according to agency officials, neither agency has statutory authority to do so. FERC has the statutory authority to regulate the siting, rates, and terms of service for interstate pipelines transporting natural gas, which is defined as "natural gas unmixed or any mixture of natural and artificial gas."[47] FERC has interpreted this statutory language to mean a gaseous mixture of hydrocarbons that is used as a fuel.[48] According to FERC officials, under this interpretation, CO_2 pipelines fall outside of the commission's jurisdiction.[49] According to the FERC Chairman's congressional testimony, he would not recommend that Congress preempt the states on CO_2 pipelines because state siting has not been a failure, unlike the situation that led to federal preemption of natural gas pipeline siting.[50] FERC officials noted that the commission could have a prospective role in regulation of CO_2 pipelines, which could be modeled on its natural gas transport and storage work, but that it would need statutory authority to take such a role.

The STB has statutory jurisdiction over pipelines that transport a commodity "other than water, gas, or oil."[51] STB's predecessor, the

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[46] FERC has jurisdiction over interstate pipelines that transport oil or natural gas. STB has jurisdiction over interstate pipelines that transport a commodity other than water, gas, or oil.

[47] 15 U.S.C. § 717a(5).

[48] Cortez Pipeline Company, 7 F.E.R.C. ¶ 61,024 (1979).

[49] *Id.*

[50] Testimony of the Honorable Joseph T. Kelliher, Chairman, Federal Energy Regulatory Commission, before the Committee on Energy and Natural Resources, United States Senate, January 31, 2008.

[51] 49 U.S.C. § 15301.

Interstate Commerce Commission, interpreted its organic statute as excluding all gas types (including CO_2), regardless of origin or source, from its jurisdiction.[52] Therefore, the commission concluded that it lacked jurisdiction over interstate CO_2 pipelines. STB staff told us that if a party sought reconsideration of the prior decision disclaiming jurisdiction over interstate CO_2 pipelines, the board would consider re-examining the commission's earlier decision.

While neither FERC nor STB has developed guidance for the regulation of interstate CO_2 pipelines, the stakeholders we interviewed had differing views on whether federal regulation of CO_2 pipelines should be expanded. Several stakeholders thought it would be necessary for the federal government to take a more active role in siting issues and CO_2 pipeline rates. On the other hand, several other stakeholders expressed concern that expanding federal regulation could have unintended consequences. For example, one industry stakeholder told us that regulating pipeline rates could discourage investment in new pipelines.

Other factors may need to be considered for CO_2 pipelines that cross federal lands managed by BLM. According to stakeholders, one key question will be whether new CO_2 pipelines should operate as common carriers under federal law. As common carriers, pipelines' terms of service would need to be just, reasonable, and nondiscriminatory. Under the Federal Land Policy Management Act, BLM has the authority to grant rights-of-way for pipelines across federal lands but not to require them to operate as common carriers. In addition, BLM officials told us they are not assessing the rights-of-way on federal lands for CO_2 pipelines because their current statutory authority for rights-of-way is sufficient.

DOE's Southwestern and West Coast Regional Carbon Sequestration Partnerships are presently conducting a CO_2 pipeline study, in conjunction with MIT and Sandia National Laboratories, which may inform the discussion about future CO_2 pipelines. According to DOE officials, the report will be issued next year. The officials note that it is not clear whether the report will address all of the relevant issues, including regulatory jurisdiction and siting decisions.[53]

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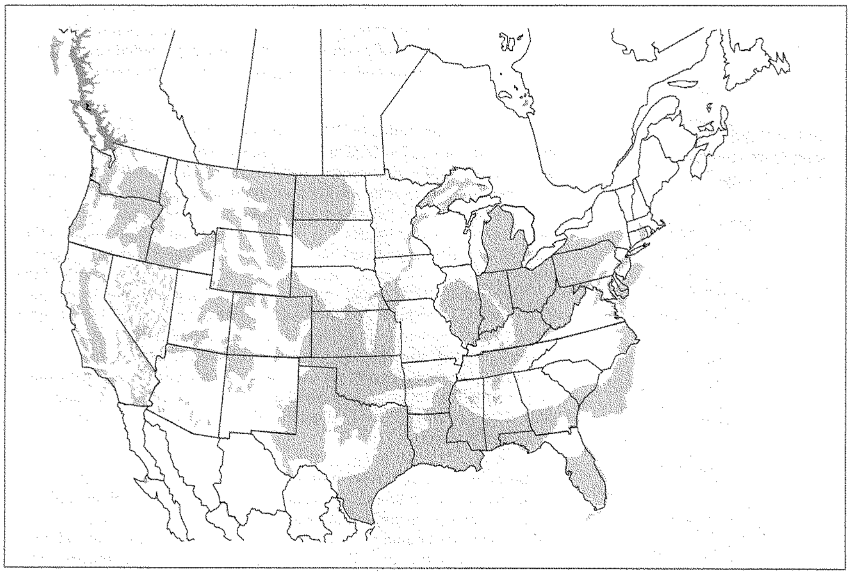
[52] 45 Fed. Reg. 85,178 (Dec. 24, 1980); 46 Fed. Reg. 18,805 (Mar. 26, 1981).

[53] DOE officials note that several of the Regional Partnerships, including the Southwest, West Coast, Southeast, Midwest, and Plains CO_2 reduction partnerships, have completed or are working on pipeline studies for their individual regions.

Detailed Assessment of Feasible CO_2 Storage Sites

In recent years, DOE has worked with state geologic survey offices and other partners to construct a national carbon sequestration geographic information system that provides information that can be used to evaluate the potential for CO_2 geologic sequestration across the United States. However, knowledgeable authorities agree that a more detailed evaluation of these sites' actual capacity is needed. As figure 4 shows, the geology of much of the United States may be well suited for CO_2 sequestration. However, a more detailed evaluation would determine whether these potential sites are actually appropriate for long-term CO_2 sequestration. For example, it is currently not known whether the caprock overlying these geologic formations is sufficient to contain stored CO_2.

Figure 4: Potential Geologic Storage in the United States



Source: GAO analysis of DOE data.

The Energy Independence and Security Act of 2007[54] requires the U.S. Geological Survey (USGS) to develop a methodology for, and conduct an assessment of, the capacity for sequestration of CO_2 in the United States. USGS officials explained that their approach will be to explore geologic formations at the individual sedimentary basin level, and they will take storage integrity and injectivity into account. They plan to begin with oil and gas reservoirs because these are the most familiar geologic formations in terms of the integrity of the reservoirs and their ability to store CO_2. USGS officials will then assess saline formations, about which less data are available. According to USGS officials, the methodology should be completed by March of 2009, at which time it will be released for external technical review and public comment. Following any needed revisions to the methodology and receipt of funding, the USGS will proceed with the actual assessment.

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[54] Pub. L. No. 110-140 (2007).

Potential Public Opposition Arising from Health Concerns over CO_2 Storage and Transport

According to the preamble to EPA's proposed rule, improperly operated injection activities or ineffective long-term storage could result in release of injected CO_2 to the atmosphere, resulting in the potential to impact human health. EPA's summaries of stakeholder workshops indicate that public health concerns have been expressed about such issues. One concern is the risk that improperly operated injections could result in the release of CO_2, and that at very high concentrations and with prolonged exposure, CO_2 can lead to suffocation. Concerns have also been raised that improperly injected CO_2 could raise the pressure in a geologic formation and, if it became too high, could cause otherwise dormant faults to trigger seismic events, such as earthquakes. The IPCC has noted, however, that 99 percent of the CO_2 stored in appropriately selected and managed formations is very likely to be retained for over 100 years,[55] and EPA states in the preamble to its proposed rule that the risk of asphyxiation and other health effects from airborne exposure to CO_2 resulting from injection activities is minimal.

Thus far at least, there has been little public opposition to the CO_2 injections that have taken place in states such as Texas to enhance oil recovery. However, several notable studies explain that this lack of publicly-expressed concern may reflect more a lack of knowledge about CCS rather than confidence that the process is safe.[56] This is suggested in the IPCC's 2005 report on CCS which stated, for example, that there is insufficient public knowledge of climate change issues and of the various mitigation options and their potential impact. In another 2005 study, researchers surveyed 1,200 people, representing a general population sample of the United States, and found that that less than 4 percent of the respondents were familiar with the terms carbon dioxide capture and storage or carbon storage.

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[55] IPCC, *IPCC Special Report on Carbon Dioxide Capture and Storage.*

[56] IPCC, *IPCC Special Report on Carbon Dioxide Capture and Storage* (2005); National Academy of Sciences, *Prospective Evaluation;* and Congressional Research Service, *Community Acceptance of Carbon Capture and Sequestration Infrastructure: Siting Challenges* (July 2008).

Some of the stakeholders we interviewed explained that public opposition could indeed grow when CCS extends beyond the relatively small projects used to enhance oil and gas recovery, to include much larger CO_2 sequestration projects located in more populated areas. One noted, in particular, that a lack of education about CCS's safety could potentially create confusion and fear when commercial-scale CCS is implemented.

Citing such concerns, a recent report by the National Academy of Sciences underscored the importance of public outreach, noting that while the success of DOE's carbon capture program depends heavily on its ability to reduce the cost of the technology, "the storage program cannot be successful if a significant fraction of the public views it as dangerous or unacceptable. Thus, the technologies must not only be safe and effective, they must be explainable to the public and the regulatory community in such a way as to instill confidence that they are in fact safe and effective."[57] The report went on to caution that "the federal government in general and the DOE in particular have not had a good track record in accomplishing this task in other programs." For its part, EPA received similar advice from its Clean Air Act Advisory Committee's Advanced Coal Technology Work Group. The Work Group's January 2008 report recommended that the agency immediately develop, in consultation with other agencies, a public outreach effort to explain carbon capture and sequestration.[58] A diverse group of panel members at EPA's 2007 UIC workshop made similar recommendations for public outreach and participation.

Accounting System for Measuring CO_2 Stored by CCS for Use in a CO_2 Emissions Trading Plan

According to a recent federal advisory committee report, an accounting system, or protocol, will be needed to quantify the CO_2 emissions from CCS. The accounting protocol could clarify uncertainty related to monitoring, reporting, quality assurance and control, and cross-border issues. Establishing this protocol would be a necessary step to integrate projects that prevent CO_2 from being emitted to the atmosphere into a future regulatory regime that addresses climate change. The advisory committee report also notes that the IPCC has released national greenhouse gas inventory guidelines for CO_2 capture, transport, injection, and storage, and that a comprehensive CCS accounting protocol developed by EPA and other agencies would provide needed guidance for applying IPCC Guidelines in the United States.

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[57] National Academy of Sciences, *Prospective Evaluation.*

[58] Clean Air Act Advisory Committee Advanced Coal Technology Work Group, Final Report of the Advanced Coal Technology Work Group.

The European Union's experience suggests that in planning for future CCS deployment, it is important to address such practical issues early in the process, particularly how to address reductions in emitted CO_2 achieved by CCS. Specifically, the European Commission proposes to revise the EU ETS to include CO_2 capture facilities, pipelines, and storage sites. A European Commission report acknowledges that resolution of this important practical matter is important to remove barriers to future CCS deployment.[59] Although EU member states can seek to include CCS projects in their national emissions cap by gaining approval from the European Commission on a case-by-case basis, proposed legislation would explicitly include, after 2012, facilities involved in the capture, transportation, and storage of CO_2 in the ETS. These facilities would then earn allowances for nonemitted CO_2 and would have to surrender emission allowances for any leakages of CO_2 that occur.

Thus far, EPA's Office of Air and Radiation has begun to develop a rule requiring mandatory reporting of greenhouse gas emissions from all sectors of the economy.[60] The agency is not, however, developing a protocol clarifying how emissions avoided as a result of a CCS project would be measured, nor how a future emissions trading plan would treat the avoided emissions. EPA officials explained that, given the pressure of other priorities, they would only develop such a protocol when mandated by Congress to do so. However, they noted that such an accounting system would be closely linked to the design of voluntary programs, future policies, and regulations to reduce greenhouse gas emissions.

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[59] EU Commission Staff Working Document, accompanying document to the *Proposal for a Directive of the European Parliament and of the Council on the Geologic Storage of Carbon Dioxide*, January 23, 2008.

[60] Specifically, EPA officials told us they are developing a proposal that would require "upstream" producers and "downstream" sources above appropriate thresholds to report their greenhouse gas emissions.

Conclusions

Recent federal and international assessments indicate that the United States will need to rely on CCS as an essential mitigation option to achieve appreciable reductions in greenhouse gas emissions. Federal agencies whose action—or inaction—will greatly affect the prospects for timely CCS deployment have taken early steps that address some barriers to CCS, but have left critical gaps that impede our understanding of CCS's full potential for reducing CO_2 emissions and that could affect CCS deployment on a broader scale.

DOE has invested heavily in advancing CCS in IGCC plants, but knowledgeable authorities agree that these facilities will account for only a small percentage of power plants' CO_2 emissions in the next several decades to come. DOE has recently begun to shift its approach in a way that also emphasizes development of CCS technology for existing coal-fired power plants. Given the broad consensus that the technology used by these plants will dominate coal-fired power plant capacity for the next several decades—both in the United States and around the world—we believe the agency should continue this trend. EPA has begun to address some of the regulatory uncertainties under the SDWA that will need resolution for a national CCS program to move forward, but other key issues associated with other environmental statutes—such as RCRA, CERCLA, and the NSR provisions of the Clean Air Act—have not been addressed.

In addition to these key barriers, there is an array of other issues that would need to be resolved if the technology is to be deployed within a time frame scientists believe is needed to address climate change. Moreover, whereas many of the technical and regulatory issues discussed earlier fall within the domain of two key agencies (DOE and EPA), these other issues cross the jurisdictions of the Departments of the Interior and Transportation, FERC, and other agencies in a manner that would require collaboration between agencies and, in many cases, coordination with state governments and other entities. While the DOE-led CCTP coordinates climate change technology research, development, demonstration, and deployment among federal agencies, it has not been tasked with resolving the issues of CO_2 pipeline regulation and infrastructure and liability for stored CO_2, among other issues. Furthermore, officials from relevant offices within the Departments of the Interior and Transportation told us they have not yet been invited to participate in CCTP discussions.

Recommendations for Executive Action

We recommend that the Secretary of Energy direct the Office of Fossil Energy to continue its recent budgetary practice of helping to ensure that greater emphasis is placed on supporting technologies that can reduce greenhouse gas emissions at existing coal-fired power plants.

We recommend that the Administrator of EPA more comprehensively examine barriers to CCS development by identifying key issues that fall outside the agency's SDWA authority. Specifically, we recommend that the Administrator direct the cognizant EPA offices to collectively examine their authorities and responsibilities under RCRA, CERCLA, and the Clean Air Act for the purposes of (1) obtaining the information necessary to make informed decisions about the regulation of (and potential liabilities associated with) the capture, injection, and storage of CO_2; (2) using this information to develop a comprehensive regulatory framework for capture, injection, and underground storage of CO_2; and (3) identifying any areas where additional statutory authority might be needed to address key regulatory and legal issues related to CO_2 capture, injection, and storage.

We recommend that the Executive Office of the President establish an interagency task force (or other mechanism as deemed appropriate) to examine the broad range of issues that, if not addressed proactively, could impede large-scale commercial CCS deployment and to develop a strategy for cognizant federal agencies to address these issues. Among the issues this task force should examine are: (1) identifying strategies for addressing regulatory and legal uncertainty that could impede the use of federal lands for the injection, storage, and transport of CO_2; (2) examining how any regulation of carbon emissions will address leakage of stored CO_2 into the atmosphere; (3) developing an accounting protocol to quantify the CO_2 emissions from capture, transport, injection, and storage of CO_2 in geologic formations; (4) examining CO_2 pipeline infrastructure issues in the context of developing a large-scale national CCS program; (5) developing a public outreach effort to explain CCS; (6) evaluating the efficacy of existing federal financial incentives authorized by the Energy Policy Act of 2005 and other relevant laws in furthering the deployment of CCS; and (7) examining the federal and state resources required to implement the EPA's expanded UIC program incorporating commercial-scale CCS.

Agency Comments and Our Evaluation

We provided a draft of this report to the Secretary of DOE and the EPA Administrator for review and comment. DOE's September 9, 2008, letter first "commend[s]... the comprehensiveness of this study, including the analysis of potential barriers to widespread commercialization of CCS and the potential need for involvement by multiple Federal agencies." The letter's subsequent comments are also consistent with the report's recommendations that (1) DOE continue to place greater emphasis on pursuing increased funding for CO_2 emissions control technologies for existing coal-fired power plants and (2) an interagency task force be established to examine critical CCS issues and develop a comprehensive CCS strategy. However, the agency expressed disagreement with our rationale for placing greater emphasis on CCS technologies applicable to these facilities and suggests a different approach for the interagency task force we recommended:

- *Placing greater emphasis on existing coal-fired power plants.* DOE says that while it agrees with the report's findings concerning the importance of pursuing CCS options for existing coal-fired power plants, these findings incorrectly imply "that DOE has focused too heavily on the IGCC option for new plants at the expense of retrofit opportunities." We are not second-guessing decisions DOE made in past decades. Rather, we are concerned about how the agency can best move forward in light of the new emphasis on substantially reducing CO_2 emissions and the scientific consensus that CCS will be needed to help reduce emissions.

- *Establishing an interagency CCS Task Force.* DOE maintained that a coordinating body—the DOE-led CCTP—already addresses these kinds of issues. However, the CCTP's scope focuses on technology; it does not address legal and institutional issues such as the resolution of CO_2 pipeline regulation and infrastructure or liability for stored CO_2, among others. In addition, officials from cognizant offices within the Departments of the Interior and Transportation told us they have not yet been invited to participate in CCTP discussions. Moreover, we continue to believe that a more centralized task force, with a broader scope than the technology-focused CCTP, may be a preferable alternative.

DOE's letter appears in appendix II, along with our responses to each of its main points. The agency separately provided technical comments, which were incorporated in our final report, as appropriate.

EPA's September 12, 2008, letter stated that providing regulatory certainty on issues related to geological storage of CO_2 was a high priority for the agency and agreed with the intent of our recommendation—to provide clarity on how the broader range of statutes within the agency's jurisdiction may apply. The agency noted that it had made an initial effort to identify and discuss these issues in the preamble of its July 2008 proposed rulemaking and had requested comments on many SDWA topics—including some of those identified in our report. It said it expected further progress on these SDWA topics after receiving input from stakeholders during the comment period (which extends through November 24, 2008). EPA did not respond to the recommendation that an interagency task force be established to examine critical CCS issues and to develop a comprehensive CCS strategy. The agency also offered several other comments and clarifications, which are presented in appendix III, along with our responses.

We are sending copies of this report to the Administrator of EPA; the Secretary of Energy; the House Select Committee on Energy Independence and Global Warming; appropriate congressional committees; and other interested parties. We will also make copies available to others on request. In addition, the report will be available at no charge on the GAO Web site at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202)512-3841 or stephensonj@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions are listed in appendix IV.

Sincerely yours,

John B. Stephenson
Director, Natural Resources and Environment

Appendix I: Objectives, Scope, and Methodology

We were asked to examine (1) the key economic, legal, regulatory, and technological barriers impeding commercial-scale deployment of carbon capture and storage (CCS) technology and (2) the actions federal agencies are taking to overcome barriers to or facilitate the commercial-scale deployment of CCS technology.

To determine the key economic, legal, regulatory, and technological barriers impeding commercial-scale deployment of CCS, we reviewed assessments by the Intergovernmental Panel on Climate Change, the National Academy of Sciences, federal agencies, nongovernmental organizations, and academic researchers. We also contacted a nonprobability sample of stakeholders from industry, including officials from electric power companies and oil and gas companies, as well as stakeholders from nongovernmental organizations and academic researchers. We selected major U.S. energy producing companies, as well as organizations and researchers that participate actively in ongoing dialogues on CCS. We also selected a number of smaller companies and organizations to ensure that we obtained a broader range of perspectives on key issues.[1] We used a semistructured interview guide to interview these stakeholders and facilitate analysis of what stakeholders identified as key economic, legal, regulatory, and technological barriers impeding commercial-scale deployment of CCS. To obtain federal agency officials' perspectives on key economic, legal, regulatory, and technological barriers, we conducted interviews with officials from the Department of Energy's (DOE) Office of Fossil Energy, the Environmental Protection Agency's (EPA) Office of Ground Water and Drinking Water and Office of Air and Radiation, as well as other agencies, primarily in the Department of the Interior and Department of Transportation.

To examine the actions federal agencies are taking to overcome barriers to or facilitate the commercial-scale deployment of CCS technology, we conducted interviews with officials from the DOE's Office of Fossil Energy and the EPA's Office of Ground Water and Drinking Water and the Office of Air and Radiation to assess these agencies' efforts to overcome barriers to or facilitate the commercial-scale deployment of CCS. Moreover, we reviewed a report by the National Academy of Sciences assessing DOE's Fossil Energy research and development programs. We reviewed reports made by two federal advisory committees, the National Coal Council advising the Secretary of Energy and the Clean Air Act Advisory Committee advising the EPA Administrator, and asked agency officials how they were implementing recommendations contained in these reports. We obtained and analyzed 12 years of DOE budget information, from fiscal year 1997 through the present, to assess the funding DOE has provided for various CO_2 capture related technologies. We reviewed the proposed EPA rule for the underground injection of CO_2 for geologic sequestration under the Safe Drinking Water Act. To obtain perspectives from outside the government, using the methodology described above we contacted a nonprobability sample of stakeholders and used a semistructured interview guide to facilitate an aggregate analysis of stakeholders' assessments of the actions of federal agencies. To assess the extent to which other federal agencies are overcoming barriers to or facilitating the commercial-scale deployment of CCS technology, we also conducted interviews with officials from federal agencies in the Department of the Interior and Department of Transportation (DOT), including the U.S. Geological Survey, Bureau of Land Management, Surface Transportation Board, and DOT's Pipeline and Hazardous Materials Safety Administration, as well as the Federal Energy Regulatory Commission. To assess the role of the Climate Change Technology Program (CCTP) in coordinating CCS-related activities across federal agencies, we interviewed a senior CCTP official and asked officials at several federal agencies about their involvement in CCTP activities. Finally, we attended two stakeholder workshops the EPA held concerning development of proposed regulations for the underground injection of CO_2 for geologic sequestration under the Safe Drinking Water Act.

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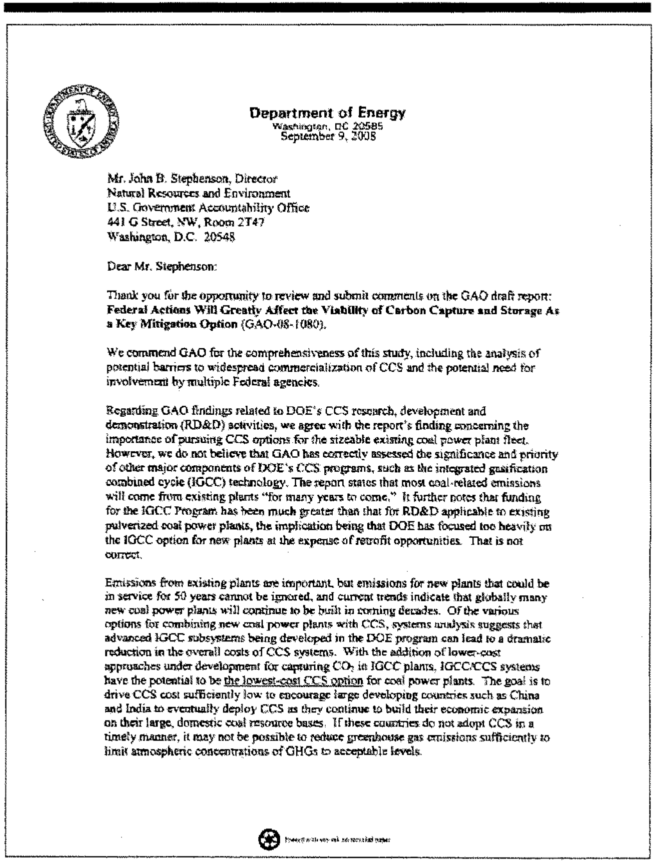
[1] Results from nonprobability samples cannot be used to make inferences about a population. This is because, in a nonprobability sample, some elements of the population being studied have no chance or an unknown chance of being selected as part of the sample.

We conducted this performance audit from October 2007 to September 2008 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: Comments from the Department of Energy

Note: GAO comments supplementing those in the report text appear at the end of this appendix.



Department of Energy
Washington, DC 20585
September 9, 2008

Mr. John B. Stephenson, Director
Natural Resources and Environment
U.S. Government Accountability Office
441 G Street, NW, Room 2T47
Washington, D.C. 20548

Dear Mr. Stephenson:

Thank you for the opportunity to review and submit comments on the GAO draft report: **Federal Actions Will Greatly Affect the Viability of Carbon Capture and Storage As a Key Mitigation Option** (GAO-08-1080).

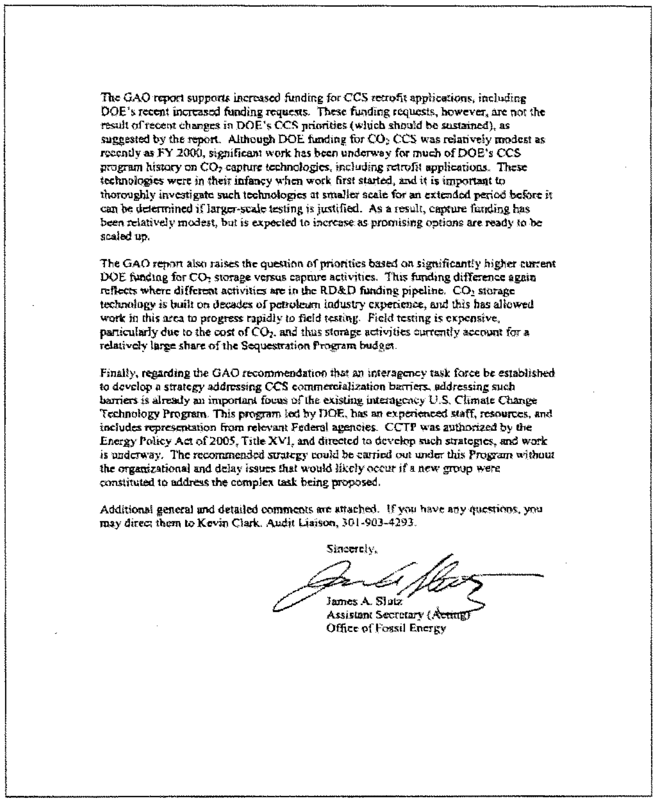
We commend GAO for the comprehensiveness of this study, including the analysis of potential barriers to widespread commercialization of CCS and the potential need for involvement by multiple Federal agencies.

Regarding GAO findings related to DOE's CCS research, development and demonstration (RD&D) activities, we agree with the report's finding concerning the importance of pursuing CCS options for the sizeable existing coal power plant fleet. However, we do not believe that GAO has correctly assessed the significance and priority of other major components of DOE's CCS programs, such as the integrated gasification combined cycle (IGCC) technology. The report states that most coal-related emissions will come from existing plants "for many years to come." It further notes that funding for the IGCC Program has been much greater than that for RD&D applicable to existing pulverized coal power plants, the implication being that DOE has focused too heavily on the IGCC option for new plants at the expense of retrofit opportunities. That is not correct.

See comment 1.

Emissions from existing plants are important, but emissions for new plants that could be in service for 50 years cannot be ignored, and current trends indicate that globally many new coal power plants will continue to be built in coming decades. Of the various options for combining new coal power plants with CCS, systems analysis suggests that advanced IGCC subsystems being developed in the DOE program can lead to a dramatic reduction in the overall costs of CCS systems. With the addition of lower-cost approaches under development for capturing CO_2 in IGCC plants, IGCC/CCS systems have the potential to be the lowest-cost CCS option for coal power plants. The goal is to drive CCS cost sufficiently low to encourage large developing countries such as China and India to eventually deploy CCS as they continue to build their economic expansion on their large, domestic coal resource bases. If these countries do not adopt CCS in a timely manner, it may not be possible to reduce greenhouse gas emissions sufficiently to limit atmospheric concentrations of GHGs to acceptable levels.

See comment 2.



See comment 3.

The GAO report supports increased funding for CCS retrofit applications, including DOE's recent increased funding requests. These funding requests, however, are not the result of recent changes in DOE's CCS priorities (which should be sustained), as suggested by the report. Although DOE funding for CO_2 CCS was relatively modest as recently as FY 2000, significant work has been underway for much of DOE's CCS program history on CO_2 capture technologies, including retrofit applications. These technologies were in their infancy when work first started, and it is important to thoroughly investigate such technologies at smaller scale for an extended period before it can be determined if larger-scale testing is justified. As a result, capture funding has been relatively modest, but is expected to increase as promising options are ready to be scaled up.

See comment 4.

The GAO report also raises the question of priorities based on significantly higher current DOE funding for CO_2 storage versus capture activities. This funding difference again reflects where different activities are in the RD&D funding pipeline. CO_2 storage technology is built on decades of petroleum industry experience, and this has allowed work in this area to progress rapidly to field testing. Field testing is expensive, particularly due to the cost of CO_2, and thus storage activities currently account for a relatively large share of the Sequestration Program budget.

See comment 5.

Finally, regarding the GAO recommendation that an interagency task force be established to develop a strategy addressing CCS commercialization barriers, addressing such barriers is already an important focus of the existing interagency U.S. Climate Change Technology Program. This program led by DOE, has an experienced staff, resources, and includes representation from relevant Federal agencies. CCTP was authorized by the Energy Policy Act of 2005, Title XVI, and directed to develop such strategies, and work is underway. The recommended strategy could be carried out under this Program without the organizational and delay issues that would likely occur if a new group were constituted to address the complex task being proposed.

Additional general and detailed comments are attached. If you have any questions, you may direct them to Kevin Clark, Audit Liaison, 301-903-4293.

Sincerely,

James A. Slutz
Assistant Secretary (Acting)
Office of Fossil Energy

The following are GAO's comments on the Department of Energy's letter dated September 9, 2008.

GAO Comments

1. DOE says that while it agrees with the report's findings concerning the importance of pursuing CCS options for existing coal-fired power plants, these findings incorrectly imply "that DOE has focused too heavily on the IGCC option for new plants at the expense of retrofit opportunities." We are not second-guessing decisions DOE made in the decades before concerns about carbon dioxide (CO_2) emissions had taken on the prominence they have today. Rather, we are concerned about how the agency can best move forward in light of the new emphasis on CO_2 emissions and the scientific consensus that CCS will be needed to help deal with them.

2. DOE says that even though CO_2 emissions from existing plants are important, current global trends indicate that many new coal power plants will continue to be built in coming decades and that many would choose IGCC as the lowest-cost CCS option if it were available. However, a DOE report, *Tracking New Coal-Fired Power Plants*, indicates that the new coal fired power plants currently being built and permitted in the United States are predominately using pulverized coal technologies, with a smaller number of plant operators opting for IGCC technology. Furthermore, DOE cites the importance of controlling CCS emissions in developing countries—in particular, China and India. However, the International Energy Agency states that "the expansion of coal-fired generation in China will continue to be based on pulverized coal" and observes that all of India's operating coal-fired power plants use a form of pulverized coal technology. That said, our report does not call for a radical shift in focus from IGCC to conventional technology, but rather a budgetary strategy that appropriately reflects a greater emphasis on developing capture technologies that could be applied to existing pulverized coal power plants. As our draft report noted, such a strategy has in fact already been reflected in recent DOE budgets.

3. DOE acknowledges that it has recently increased requested funding for CCS technologies applicable to existing plants, but states that the increase does not necessarily reflect a higher priority. Rather, the increase reflects an evolution of the technology development process. Specifically, it is now moving from investigating such technologies from a less costly small scale to the point where costs rise as technology development is "scaled up." Recent statements by the agency, however, suggest that research applicable to existing coal-

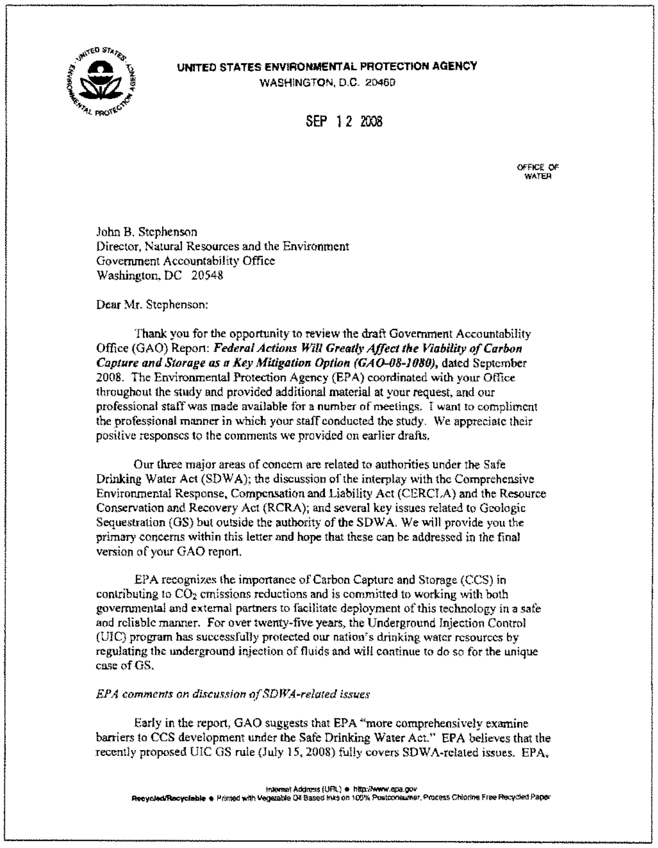
fired power plant technologies do warrant a higher priority. In particular, DOE's recent funding announcement for CCS technology development for existing pulverized coal power plants states that this funding opportunity is "driven by the fact that existing coal-fired power plants produce a sizeable portion of current CO_2 emissions from all fossil fuel-based sources, and that only about 6 GW of the existing coal-fired electricity generating fleet is projected to retire by 2030." Similarly, in our discussions with DOE fossil energy officials about their fiscal year 2008 budget priorities, they pointed to language in House Report 110-185, which recommended "a rigorous research program on the potential for retrofitting existing coal plants for CO_2 capture and sequestration."

4. DOE questions the report's observation that funding for CO_2 storage has been significantly higher than the resources devoted to CO_2 capture, noting that the higher funding level for storage-related activities reflects the fact that it has evolved to the point where advances in storage would now require expensive field-testing. We do not dispute the need to invest in the field-testing of storage activities. Rather, we note that timely CCS deployment will occur only if progress is made with both capture and storage and that considerably more progress is needed on the capture front. A comprehensive CO_2 storage capability will mean little if there is no CO_2 to store.

5. DOE maintains that a coordinating body—the DOE-led Climate Change Technology Program (CCTP)—already addresses CCS-related issues. However, the CCTP's scope focuses on technology; it does not address legal and institutional issues such as CO_2 pipeline regulation and infrastructure or liability for stored CO_2, among others. In addition, officials from cognizant offices within the Departments of the Interior and Transportation told us they have not yet been invited to participate in CCTP discussions. Moreover, we continue to believe that a more centralized task force, with a broader mission than the technology-focused CCTP, may be a preferable alternative.

Appendix III: Comments from the Environmental Protection Agency

Note: GAO comments supplementing those in the report text appear at the end of this appendix.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

SEP 12 2008

OFFICE OF
WATER

John B. Stephenson
Director, Natural Resources and the Environment
Government Accountability Office
Washington, DC 20548

Dear Mr. Stephenson:

Thank you for the opportunity to review the draft Government Accountability Office (GAO) Report: ***Federal Actions Will Greatly Affect the Viability of Carbon Capture and Storage as a Key Mitigation Option (GAO-08-1080),*** dated September 2008. The Environmental Protection Agency (EPA) coordinated with your Office throughout the study and provided additional material at your request, and our professional staff was made available for a number of meetings. I want to compliment the professional manner in which your staff conducted the study. We appreciate their positive responses to the comments we provided on earlier drafts.

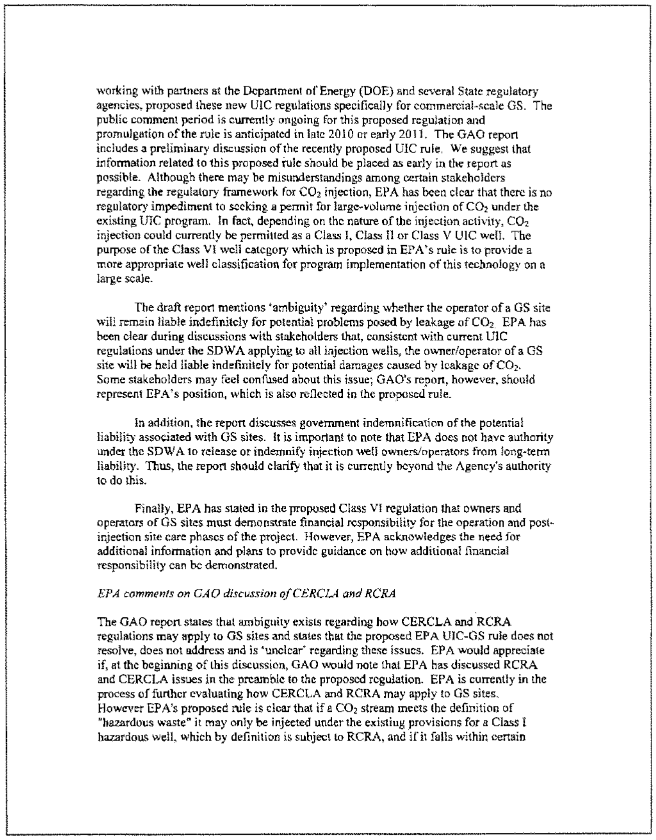
Our three major areas of concern are related to authorities under the Safe Drinking Water Act (SDWA); the discussion of the interplay with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA); and several key issues related to Geologic Sequestration (GS) but outside the authority of the SDWA. We will provide you the primary concerns within this letter and hope that these can be addressed in the final version of your GAO report.

EPA recognizes the importance of Carbon Capture and Storage (CCS) in contributing to CO_2 emissions reductions and is committed to working with both governmental and external partners to facilitate deployment of this technology in a safe and reliable manner. For over twenty-five years, the Underground Injection Control (UIC) program has successfully protected our nation's drinking water resources by regulating the underground injection of fluids and will continue to do so for the unique case of GS.

EPA comments on discussion of SDWA-related issues

See comment 1.

Early in the report, GAO suggests that EPA "more comprehensively examine barriers to CCS development under the Safe Drinking Water Act." EPA believes that the recently proposed UIC GS rule (July 15, 2008) fully covers SDWA-related issues. EPA,



working with partners at the Department of Energy (DOE) and several State regulatory agencies, proposed these new UIC regulations specifically for commercial-scale GS. The public comment period is currently ongoing for this proposed regulation and promulgation of the rule is anticipated in late 2010 or early 2011. The GAO report includes a preliminary discussion of the recently proposed UIC rule. We suggest that information related to this proposed rule should be placed as early in the report as possible. Although there may be misunderstandings among certain stakeholders regarding the regulatory framework for CO_2 injection, EPA has been clear that there is no regulatory impediment to seeking a permit for large-volume injection of CO_2 under the existing UIC program. In fact, depending on the nature of the injection activity, CO_2 injection could currently be permitted as a Class I, Class II or Class V UIC well. The purpose of the Class VI well category which is proposed in EPA's rule is to provide a more appropriate well classification for program implementation of this technology on a large scale.

See comment 2.

The draft report mentions 'ambiguity' regarding whether the operator of a GS site will remain liable indefinitely for potential problems posed by leakage of CO_2. EPA has been clear during discussions with stakeholders that, consistent with current UIC regulations under the SDWA applying to all injection wells, the owner/operator of a GS site will be held liable indefinitely for potential damages caused by leakage of CO_2. Some stakeholders may feel confused about this issue; GAO's report, however, should represent EPA's position, which is also reflected in the proposed rule.

See comment 3.

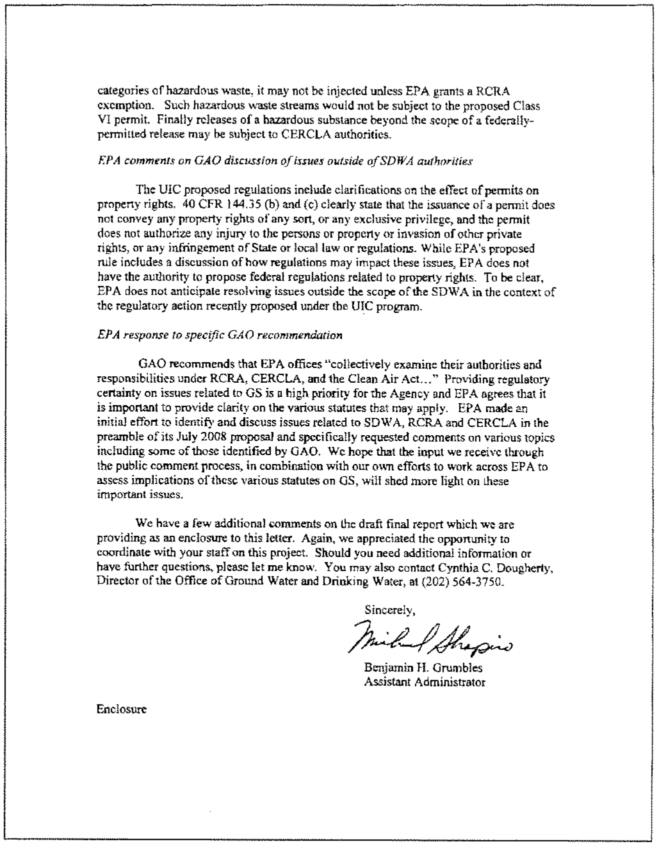
In addition, the report discusses government indemnification of the potential liability associated with GS sites. It is important to note that EPA does not have authority under the SDWA to release or indemnify injection well owners/operators from long-term liability. Thus, the report should clarify that it is currently beyond the Agency's authority to do this.

Finally, EPA has stated in the proposed Class VI regulation that owners and operators of GS sites must demonstrate financial responsibility for the operation and post-injection site care phases of the project. However, EPA acknowledges the need for additional information and plans to provide guidance on how additional financial responsibility can be demonstrated.

EPA comments on GAO discussion of CERCLA and RCRA

See comment 4.

The GAO report states that ambiguity exists regarding how CERCLA and RCRA regulations may apply to GS sites and states that the proposed EPA UIC-GS rule does not resolve, does not address and is 'unclear' regarding these issues. EPA would appreciate if, at the beginning of this discussion, GAO would note that EPA has discussed RCRA and CERCLA issues in the preamble to the proposed regulation. EPA is currently in the process of further evaluating how CERCLA and RCRA may apply to GS sites. However EPA's proposed rule is clear that if a CO_2 stream meets the definition of "hazardous waste" it may only be injected under the existing provisions for a Class I hazardous well, which by definition is subject to RCRA, and if it falls within certain



categories of hazardous waste, it may not be injected unless EPA grants a RCRA exemption. Such hazardous waste streams would not be subject to the proposed Class VI permit. Finally releases of a hazardous substance beyond the scope of a federally-permitted release may be subject to CERCLA authorities.

EPA comments on GAO discussion of issues outside of SDWA authorities

See comment 5.

See comment 6.

The UIC proposed regulations include clarifications on the effect of permits on property rights. 40 CFR 144.35 (b) and (c) clearly state that the issuance of a permit does not convey any property rights of any sort, or any exclusive privilege, and the permit does not authorize any injury to the persons or property or invasion of other private rights, or any infringement of State or local law or regulations. While EPA's proposed rule includes a discussion of how regulations may impact these issues, EPA does not have the authority to propose federal regulations related to property rights. To be clear, EPA does not anticipate resolving issues outside the scope of the SDWA in the context of the regulatory action recently proposed under the UIC program.

EPA response to specific GAO recommendation

GAO recommends that EPA offices "collectively examine their authorities and responsibilities under RCRA, CERCLA, and the Clean Air Act..." Providing regulatory certainty on issues related to GS is a high priority for the Agency and EPA agrees that it is important to provide clarity on the various statutes that may apply. EPA made an initial effort to identify and discuss issues related to SDWA, RCRA and CERCLA in the preamble of its July 2008 proposal and specifically requested comments on various topics including some of those identified by GAO. We hope that the input we receive through the public comment process, in combination with our own efforts to work across EPA to assess implications of these various statutes on GS, will shed more light on these important issues.

We have a few additional comments on the draft final report which we are providing as an enclosure to this letter. Again, we appreciated the opportunity to coordinate with your staff on this project. Should you need additional information or have further questions, please let me know. You may also contact Cynthia C. Dougherty, Director of the Office of Ground Water and Drinking Water, at (202) 564-3750.

Sincerely,

Michael Shapiro

Benjamin H. Grumbles
Assistant Administrator

Enclosure

The following are GAO's comments on the Environmental Protection Agency's letter dated September 12, 2008.

GAO Comments

1. EPA says that its recently-proposed UIC rule fully covers Safe Drinking Water Act (SDWA)-related issues. We have modified the report to more fully reflect the work that EPA is doing to examine SDWA-related barriers to CCS deployment. However, while we acknowledge that the proposed rule discusses and seeks comments on many issues, we continue to believe that it leaves many of these issues unresolved. While EPA's proposed rule prohibits the injection of CO_2 above the lowermost formation containing an underground source of drinking water, EPA is still exploring whether the UIC director should be given the authority to approve such an injection—an issue that can affect whether unmineable coal seams are used for CO_2 storage.

2. EPA suggests that the report should state EPA's position on whether the operator of an injection well will remain liable indefinitely for potential problems posed by leakage of CO_2. Pages 23 and 39 of the draft report did in fact state that well operators remain responsible indefinitely for any endangerment for underground sources of drinking water caused by such leakage. However, the draft report also addressed other unresolved liability issues of concern to stakeholders, which are unrelated to endangerment of underground sources of drinking water. We have added language to further emphasize these issues.

3. EPA says that it is important to note that the agency does not have authority under the SDWA to release injection well owners or operators from long-term liability. The draft report had already done so on page 39 and 40, where it explained that EPA does not have the statutory authority to release well owners or operators from liability or transfer financial responsibility from the well owner or operator to a third party. In response to EPA's comments, we have added language to the report to further clarify this point.

4. EPA suggests that GAO note in its final report that EPA had discussed RCRA and CERCLA issues in the preamble to its proposed rule. The draft report had, in fact, mentioned that EPA addressed RCRA and CERCLA issues in the preamble. For example, page 42 of the draft noted that the preamble explained that pure CO_2 in and of itself is not listed as a hazardous substance under CERCLA, and cautioned that injected CO_2 streams could contain hazardous constituents that would make these streams "hazardous." That said, we continue to believe that

the preamble's limited treatment of these issues still leaves much to be resolved about the implications of the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for CO_2 sequestration. Specifically, EPA suggests that determinations about whether injected CO_2 is a hazardous waste or substance will be made on a case-by-case basis. Moreover, EPA says it is "currently in the process of further evaluating how CERCLA and RCRA may apply to [geologic sequestration] sites."

5. EPA notes that the proposed rule includes clarifications on the effect of permits on property rights. However, these effects were not among the property rights-related issues of greatest concern to the stakeholders we interviewed. As we stated in the report, these stakeholders told us they were concerned about a lack of clarity regarding ownership of injected CO_2 and ownership of geologic formations.

6. Notwithstanding the permit-related property rights issues raised in comment 5 above, EPA explains that it does not have the authority to propose federal regulations related more broadly to property rights issues. We agree that EPA's authority does not extend to many of these issues discussed in the report, which is why the report notes that the resolution of this and other issues will require the involvement of other federal agencies and, in some cases, states.

Appendix IV: GAO Contact and Staff Acknowledgments

GAO Contact

John B. Stephenson, (202) 512-3841 or stephensonj@gao.gov

Staff Acknowledgments

In addition to the contact named above, Steve Elstein, Assistant Director; Chuck Bausell; Cindy Gilbert; Katheryn Summers Hubbell; Michael O'Neill; Ben Shouse; Jeanette Soares; and Michelle Woods made major contributions to this report. Additional assistance was provided by Katherine M. Raheb and Melinda Cordero.

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EPA was asked to provide technical assistance on the following questions. EPA's responses are provided below the questions.

Do you have any analysis of the effects of distributing allowances to utilities based on W-M formula vs. based 100% on emissions vs. 100% load (any regional/state break-down; any calculations of %age of emissions covered)? I understand EEI might have some of this too. I believe this is what my boss discussed with the Administrator, and is the issue my boss is hearing a lot about from the state. And what is the Agency's read on often over-looked insertion before House floor vote that appears to prevent a utility from receiving more allowances than its emissions? Does EPA agree that this language trumps the formula and would in fact prevent windfalls for major energy producers of low-carbon emitting sources (e.g., nuclear)? There seems to be a split interpretation of this restriction.

EPA RESPONSES:

Allocation Estimates

Estimates for state allocations are included in Table 1. Note that these are rough estimations based on the best currently available data, described in more detail below. Actual allocations will be different, since the owner or operator of each LDC has the ability to define their baseline as a period of any 3 consecutive years from 1999-2008. Furthermore, this analysis does not consider the impact of new coal generation built prior to 2013.

Only 2012 allocations are presented, as the following years will change proportionately (absent updating based on number of customers). In 2012, LDC allocations are equal to 43.75% of the total allowance pool after 1% of allowances are withheld for strategic reserve auctions. We assume the maximum allocation to merchant coal generators (10% of LDC allocations, phasing out over time), and withhold that value from these estimates.

Delivery estimates are based on sales reported in EIA 861, taking the average of 2006 and 2007 total retail sales by distribution company.

Emissions were estimated using the average of 2006 and 2007 EIA 861 retail sales by delivery state and applying EPA eGRID regional emission factors. These emission values are rough estimates, since the emission factors are based on large geographic regions (see figure 1), and were calculated using available 2005 emission and generation data.

Prohibition against excess distributions in Sec. 783(b)(4)

The language prohibiting distribution of more allowances than "necessary to offset any increased electricity costs to [the electric distribution company's] retail ratepayers, including increased costs attributable to purchased power costs, due to enactment of this title" does take precedence over, and sets a limitation on each electric distribution company's [LDC's] annual distribution of allowances under, the language establishing an allowance distribution methodology based on LDC emissions and deliveries. This is because the prohibition language states that the prohibition applies "notwithstanding" the distribution methodology language.

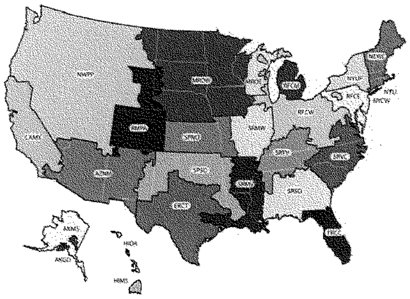
However, the prohibition provision would be very difficult to implement because it would require a great deal of speculation. First, the Administrator would need to determine (either through projection before the year for which allowances are distributed or through actual data after the year for which allowances are distributed) the total cost of the electricity distributed to its customers each year starting with 2012. Second, the Administrator would need to estimate (again either up front or after the year of the allowance distribution) what each LDC's total cost of electricity would be each year in the absence of the ACES GHG cap and trade program. Total electricity costs would depend on a number of factors that would have to be projected, including the sources and amounts of purchased power, the mix of generation of purchased and LDC generated power, fuel costs, technology advancements (e.g., in generation), transmission constraints, and electricity demand. Any attempt to remove the impact of the cap and trade program on these factors and thus on total electricity costs would be speculative at best. The Administrator might also have to consider the ability of each LDC to pass through these costs to its customers. The difference between these two total cost figures for a given year, divided by the market value of an allowance for that year, would be the limitation on the amount of allowances that an LDC could be distributed for that year. The limitation could be implemented by limiting up front the distribution or by requiring the LDC to return later to the Administrator any amount of allowances in excess of the limitation. The excess allowances would be redistributed to other LDCs, but an iterative process would be required to ensure that the redistribution of excess allowances would not increase any LDC's total allowance distribution above that LDC's limitation. EPA notes that the prohibition provision could reward higher costs to LDC retail ratepayers in that the higher the level of an LDC's costs, the higher the limitation on the LDC's allowance distribution.

Table 1. Allocation Estimates by Delivery State

		2012 Allocation (Million Tons)					2012 Allocation (Million Tons)		
Delivery State	Annual Emissions Estimate (Million Tons)*	HR 2454 Formula (50/50 Emission /Load)	100% Emissions-Based	100% Load-Based	Delivery State	Annual Emissions Estimate (Million Tons)*	HR 2454 Formula (50/50 Emission /Load)	100% Emissions-Based	100% Load-Based
AK	3	3	3	3	MT	6	6	5	7
AL	62	47	50	44	NC	67	58	54	62
AR	26	22	21	23	ND	10	7	8	6
AS	0	0	0	0	NE	23	16	19	13
AZ	45	36	36	36	NH	5	5	4	5
CA	87	99	70	127	NJ	41	36	33	39
CO	43	30	35	24	NM	14	11	11	11
CT	14	14	11	16	NV	19	16	15	17
DC	6	5	5	6	NY	57	58	46	69
DE	6	5	5	6	OH	110	82	89	76
FL	138	111	112	111	OK	41	30	33	27
GA	92	70	74	66	OR	20	20	16	23
GU	1	1	1	1	PA	84	70	68	72
HI	8	6	7	5	PR	14	11	11	10
IA	36	25	29	21	RI	3	3	3	4
ID	10	9	8	11	SC	42	37	34	39
IL	107	78	87	70	SD	9	6	7	5
IN	75	56	61	52	TN	72	54	58	51
KS	35	24	29	19	TX	205	165	166	164
KY	62	47	50	44	UT	11	11	9	13
LA	42	36	34	38	VA	61	51	49	53
MA	24	23	19	27	VI	1	0	0	0
MD	35	29	28	31	VT	2	2	2	3
ME	5	5	4	6	WA	35	35	28	41
MI	77	57	62	52	WI	55	39	44	34
MN	56	39	45	33	WV	23	17	19	16
MO	70	49	57	40	WY	8	7	7	7
MS	29	23	24	23	Total	2,234	1,802	1,802	1,802

* Estimate calculated using 2006-2007 retail sales and eGRID emission factors

Figure 1. eGRID Emission Factor Regions



Environment and Public Works Committee Hearing
October 29, 2009
Follow-Up Questions for Written Submission

Questions for Mike Carey, President, Ohio Coal Association

Questions from:

Senator James M. Inhofe

1. Today we heard from Rio Tinto, a mining company, who favors the Kerry-Boxer bill along with your testimony on behalf of the Ohio Coal Association. Why would a mining company such as Rio Tinto advocate for a cap-and-trade mechanism and increased nuclear provisions while the Ohio Coal Association stands firmly against the Kerry- Boxer bill?

Senator, thank you for asking such a crucial question. The Rio Tinto Group is a major international company based in London, England and Melbourne Australia.

Looking specifically at the domestic operations of Rio Tinto and Rio Tinto Energy America, it is evident that they have a diversified interest in various types of mining - metals, coal and uranium. As the largest uranium producer in the United States, Rio Tinto stands much to gain by having 100 new nuclear power plants built within the next 20 years, as they are one of the few companies with the holdings and financial capability to expand uranium mining. According to Rio Tinto's oral testimony yesterday, Rio Tinto is poised, as the nation's largest uranium producer, to corner the entire domestic uranium market. As such, it appears that their testimony and position is inline more as a nuclear material mining company than a coal company.

Coal mining is a small portion of Rio Tinto's revenues. Rio Tinto Energy America is in the process of selling their entire coal mining operation, piece by piece. In March, Rio Tinto sold their largest domestic coal mine. Further, they have publicly stated their goal to sell off the rest of their coal operations[1].

The Ohio Coal Association represents coal companies, not uranium companies. For one, our companies do not have overseas operations that we can shift resources to. Second, our companies focus on coal mining, and cannot divert domestic resources to other types of mining operations. Third, we are committed to keeping jobs in Ohio and the United States.

2. The CEO of Exelon testified today on behalf of increasing nuclear power. How does that affect the role of coal and, in particular, the companies represented by the Ohio Coal Association?

According to their website, "Exelon Nuclear operates the largest fleet of nuclear generating stations in the nation, and the third largest fleet in the world. Exelon Nuclear's 10 stations, with 17 reactors, represent approximately 20 percent of the U.S. nuclear industry's power capacity, and about three percent of all U.S. power generation."

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[1] Press release, March 9, 2009 http://www.riotinto.com/media/5157_17192.asp

Yes, Exelon does operate fossil fuel-fired power plants, some of which use coal. However, given Exelon's operation of natural gas turbines as well, they have already cultivated the relationships and fuel sources that will allow them to engage in seamless fuel-switching from coal to natural gas in their power plants. In addition, as John Rowe acknowledged during the hearing, Exelon stands to profit from the increased value of their nuclear plants. The Waxman-Markey bill will add $700 to $750 million to Exelon's annual revenues for every $10 per metric ton (Mt) increase in the price of CO2 allowances. Such a revenue increase would contribute $0.67-$0.72 to earnings per share. Exelon estimates that the price of CO2 allowances, when the law takes effect in 2012, will range from $15 to $18/Mt, implying a positive earnings impact of $1.00 to $1.30 per share.[2] In addition, Exelon stands to profit from the increased sale of thei nuclear energy in a carbon-constrained world.

In a nation without Kerry-Boxer legislation, coal and nuclear power plants could continue to be built and operate based on regional economics and regulations. However, it is evident based on Mr. Rowe's testimony that he is forsaking his coal operations for the potential growth of Exelon's nuclear business. On page 3 of his written testimony, Mr. Rowe states that in relation to changing the allowance structure, "Doing so would mean that virtually all of the benefits of the allowances would go to states whose generation is principally coal based and would not be fair to customers of utilities who have already made substantial investments in low carbon emitting generation fleets." The Ohio Coal Association firmly believes that any climate legislation should not reward companies such as Exelon. Climate legislation should never be viewed as a windfall profit.

I did agree with one aspect of Mr. Rowe's testimony. He said, "We do not expect substantial deployment of either new nuclear generating stations or new coal generating stations with carbon capture and sequestration in a timeframe that will achieve the results mandated by the draft."

The Ohio Coal Association wants to keep electricity prices low. Nuclear power can help do that, but people like Mr. Rowe are attempting to use legislation to shift more market share to their companies at the expense of our nation's coal producers and electricity consumers. Legislation shouldn't penalize one energy source at the expense of another.

3. Your written and verbal testimony began to touch on the dangers of EPA regulating carbon dioxide under the Clean Air Act. Can you explain how that would impact coal? In addition, many people have said that Congress needs to act in order to stop EPA from regulating C02, would the Kerry Boxer Bill prevent EPA regulations?

If EPA is allowed to move forward with Clean Air Act regulations does coal, it will create as Congressman Dingell states, "a glorious mess." There would be overlapping regulatory restrictions that would make it virtually impossible to invest in new technologies because of the New Source Review provisions.

Massachusetts v. EPA determined that EPA may regulate mobile sources under the Clean Air Act. Legislation must include explicit Clean Air Act exemption language to ensure that numerous regulations are not layered to prevent the continued use of coal. In addition, the Clean Air Act itself presents large barriers to the adoption of CCS technologies.

No, the bill does not prevent EPA from issuing regulations on carbon dioxide under the Clean Air Act. Though the House-passed Waxman-Markey legislation docs prevent some duplicate

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regulations, the Kerry-Boxer draft omits this provision. Upon the introduction of the Senate legislation, EPA Administrator Jackson said, "What we want is legislation. The technical work we would do in support of this rule is consistent with proposed legislation and will not add time to the process. But we will use existing authorities while we wait for new authority." Her testimony during Tuesday's hearing shows her commitment to using the Clean Air Act to regulate CO2, as she says there are still "common-sense" ways to use the Clean Air Act to further emissions reductions. This is in addition to the newly proposed Prevention of Significant Deterioration pre-construction permitting and greenhouse gas tailoring rule introduced the same day as the Kerry-Boxer legislation. This bill simply layers on top of the existing command and control requirements of the Clean Air Act, a new cap and trade system, as well as other regulatory programs. Instead of relieving the burden of the EPA regulations, this bill exponentially increases the burdens.

4. You stated in your testimony that coal miners make on average $64,000, how do the coal jobs compare to green jobs?

To clarify, the $64,000 figure refers to coal miners in Ohio. According to the National Mining Association (using U.S. Bureau of Labor Statistics), the average wage for all U.S. coal miners is actually $72,222, which is $26,854 more than the average for all U.S. workers at $45,368[3]. Coal miners and their families enjoy the highest standard of living in their communities.

Now, let me get to the root of the question. The difference between coal jobs and green jobs is relatively straightforward: coal jobs exist and green jobs are hypothetical. The only green jobs so far have been unimpressive in both their quantity and quality of benefits provided. In Newton, Iowa, a former Maytag facility has new "green" jobs producing windmill turbines. This facility employs 500 individuals making $13 dollars per hour on average. The turbine plant used to employ 1,800 employees making an average of $20 per hour, totaling a net loss of 1,300 employees at $7 per hour or $18.2 million in lost wages, not to mention the lost tax revenue in Newton.

Many green jobs advocates have been touting the relatively high numbers of prospective green jobs, though it is important to encourage productivity in addition to raw job numbers.

Coal mining is centuries old; technique that enhance productivity are consistently being refined so our community can afford pay significantly above-average wages. Green jobs will not have the same productivity as coal mining, and as such will require finite resources to be disbursed over a greater number of people. Green jobs also ignore the fact that people have talents that allow for specialization in fields that help produce lower-cost goods and services. Coal mining and its supported industries have a significant advantage on green jobs in that our education system can produce well-trained individuals suited for our industry. One need only look at universities with dedicated schools of mining and geology programs that help maximize mining extraction while minimizing footprint.

The Federal government has already committed $62 billion in direct spending and $20 billion in tax incentives in the American Recovery and Reinvestment Act to create green jobs, says noted environmentalist publication Grist[4]. We cannot confuse government mandates with market forces;

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[3] http://www.nma.org/pdf/c_wages_state_industries.pdf

[4] See Kate Sheppard, *A Green Tinged Stimulus Bill*, GRIST (Feb. 12, 2009) available at http://gristmill.grist.org/story/2009/2/12/83439/6486.

assuming climate legislation is fixed so that it doesn't kill coal, markets will continue to provide steady, high-paying jobs while green jobs will continue to rely on legislative mandates and funding.

Senator George V. Voinovich

1) Mr. Carey - Your testimony to this committee is important, because coal is the world's most abundant and cheap energy resource. Its strategic value from both a national security and economic perspective cannot be underestimated. The United States has over 250 years of proven coal reserves. It makes no sense to put a policy in place that would jeopardize this resource. Recall that 50 percent of electricity in our country comes from coal. And in Ohio, we rely on coal even more - it provides 85 percent of our electricity. And as you mentioned, Ohio's coal workers make $25,000 more a year than the average Ohioan. These are indeed good, high paying jobs that our communities in Ohio have come to rely upon.

Given the prospect of legislation that creates an increasingly tight cap on carbon emissions, several overlapping and redundant air pollution and emission control standards, a renewable energy standard, and host of regulations that require additional environmental compliance, does it make sense for any company to continue investing in coal generation? Do you feel the Kerry-Boxer bill is pushing coal out of the nation's energy portfolio instead of embracing ways to utilize this plentiful, domestic resource?

Senator Voinovich, thank you for your questions and your years of service to Ohio.

Congress and the current Administration are certainly creating a hostile environment for the continued use of coal. Their policies seem to be geared towards making coal obsolete and in the process, drastically increasing our nation's electricity costs. It is impossible to reconcile the investment in CCS with the anti-coal provisions in the legislation and emanating from the Obama Administration. By the time CCS might be commercially available, the cap and other anti-coal policies will have completely decimated the United States coal industry.

The proposed legislation itself is dissuading Ohio Coal Association member companies from investing in the United States coal industry. One of our member companies is seeking to invest and develop coal mines in foreign countries rather than in the United States. The "threat" of legislation cannot be greatly expanded to our other companies, else we witness a large sum of resources go abroad.

2) Mr. Carey - In your testimony, you stated that the even the EIA's analysis used assumptions that weren't very realistic which in your opinion caused their economic impacts to be under reported. Nearly by two-thirds in some of the cases you mentioned. As you may know, I've been working with the EPA to ensure their analysis incorporates realistic assumptions about technology adoption for nuclear, CCS, and biomass. Could you explain to us what assumptions the EIA made that weren't realistic - and what the more realistic assumptions would be?

EIA's modeling has been thoroughly disparaged by both the legislation's proponents and opponents. The Ohio Coal Association stands behind you in your request to the EPA to conduct a complete analysis incorporating realistic assumptions about technology adoption, among other things.

EIA's assumes that there will be an enormous increase in nuclear energy by 2030, something that Mr. Rowe of Exelon said was "impossible." Furthermore, the EIA assumes the availability of CCS technology to not only be technologically available, but also past the immense legal and regulatory hurdles that Kerry-Boxer does not address. EIA also relies on the availability of credible offsets, both domestic and international, despite explicitly stating in their report, "One recent analysis doubts that even 150 MMT of international offsets will be used by 2020." Finally, the EIA (like the EPA) models only the cap-and-trade specific portion of the legislation, and does not factor in the costs associated with the mandated efficiency measures and Renewable Electricity Standard.

3) Mr. Carey - Based on this bill, do you believe that there is a future for coal without CCS technologies? Based on the current level of technology, what year do you see CCS as a viable commercial option for coal power plants? Can you highlight the industry's perspective of the major roadblocks to commercial CCS deployment? What else can Congress specifically do to help speed up the deployment of CCS?

First, based on this bill I believe coal will be gone long before CCS is available. Even absent the other anti-coal provisions, all this legislation does is throw money at CCS. It doesn't solve the other CCS-related issues which must be addressed before the CCS technology becomes available. This includes, but is not limited to, regulatory framework for storage, intellectual property rights (Kerry-Boxer even goes as far to strip IP protection from CCS technologies) and general liability concerns; conflicting impacts from other environmental statutes such as the Clean Air Act, hazardous waste laws, the Safe Drinking Water Act, and more. Congress must address these issues and not merely with a series of meaningless reports back to Congress.

Congress must not rely on technology that is not yet commercially available.

The industry believes that the development of full-scale CCS technologies is 15-20 years away at best. However, the wide deployment of such technologies, assuming they can be developed, is even further away. Former Acting Assistant DOE Secretary for Fossil Energy Thomas D. Shope in 2007 said, "We're not going to see common, everyday deployment [of those technologies] until approximately 2045." We agree with this assessment and as such, say that any targets and timelines considered by Congress must reflect these professional, industry assessments.

The bill neglects the difficulty of transportation and storage of sequestered CO2. There are questions to be resolved regarding pipeline network requirements, economic regulation, utility cost recovery, regulatory classification of CO2 itself, and pipeline safety. Congress must address federal jurisdictional authority over CO2 pipelines under existing law and legislation must address issues if a CO2 pipeline network grows and crosses state lines.

The DOE has taken steps towards identifying potential carbon dioxide storage capacity in the U.S. However, initial test results are still years away; these will determine effectiveness of the different types of storage reservoirs. Long-term stewardship issues that must be addressed in order to advance CCS are forced to wait for these test results.

Furthermore, I urge you to strip out the language in Kerry-Boxer that specifically allocates CCS money to natural gas. CCS funds should not favor one source over another; else we create highly-stratified technologies that won't be adaptable to different power plants and other carbon dioxide-emitting sources. This language is entirely counter-productive to advancing CCS.

Senator BOXER. We appreciate it.

Mr. Stallman, you are next. Let me give you a proper introduction. Bob Stallman is the President of the American Farm Bureau, a federation, and he is a rice and cattle producer from Columbus, Texas.

Welcome, sir.

STATEMENT OF BOB STALLMAN, PRESIDENT, AMERICAN FARM BUREAU FEDERATION

Mr. STALLMAN. Thank you, Madam Chairwoman, Ranking Member Inhofe, members of the committee. It is my pleasure to be here to testify on behalf of the American Farm Bureau Federation, the Nation's largest general farm organization.

Earlier this year, I testified before this committee to outline our concerns with cap and trade proposals. The Farm Bureau actively opposed legislation that came before the House of Representatives in June. We have similar concerns about S. 1733 and are opposed to that legislation as well.

We have a number of fundamental concerns about cap and trade and the way such a program is laid out in the House and Senate bills. The costs of cap and trade are significant. Farmers and ranchers will pay higher fuel, feed and fertilizer costs. Families will be hit hard with energy costs alone growing by as much as $1,870 per household. Adding in higher food prices could mean costs of nearly $200 billion a year to our citizens.

Both the House bill and the Senate counterpart have the effect of creating an energy deficit by restricting the use of fossil fuels and not laying out any effective program for replacing those fuels. Nowhere in the bills is there a pathway to reinvigorating the Nation's civilian nuclear energy sector to the extent assumed in the EPA projections.

These bills also seem to be predicated on an overly optimistic scenario for the deployment of carbon capture and storage. It should be pointed out that the last nuclear power plant built in the United States started construction in 1977; that there are no current commercially available viable carbon capture systems in place for coal-fired plants; nor is there international trading in carbon offsets of the scale and magnitude contemplated by the bill in existence today.

Advocates for cap and trade are strident in their objections to coal and the use of other fossil fuels. Clearly, they are entitled to their opinions. But it is not enough simply to be against something. You must be for something as well. A mandatory cap and trade program will effectively create a hole in our energy supply. It is Congress' job to plug that hole, not simply create it, by passing legislation that is realistic, straightforward, and that sets out a cost effective, pragmatic path for our economy and our energy future.

Unfortunately, S. 1733 fails to do that. Under virtually any scenario, the U.S. agricultural sector will shrink, either through payments to landowners to take land out of growing crops and to grow trees instead, or through producers going out of business because they cannot compete in the new cost structure imposed on the sector.

Let me be clear. It is the sharp movement of land out of crop production into forestry that provide the revenue effects for agriculture the Administration has been discussing relative to this legislation. Those effects are in the EPA analysis. That also means a downsizing of American agriculture's capability to produce food. That outcome will inevitably mean higher food costs for consumers.

An additional problem is that, at least for the present and unlike the House bill, S. 1733 does not specifically provide a place for agriculture and forestry in its offset program. Instead, the bill places the entire offsets program at the complete discretion of the President, with no sector being assured that any of the offset opportunities this might provide will even be eligible to participate in the program. In this, S. 1733 takes a step backward from the House bill.

As U.S. agricultural production declines, world dependence on the U.S. food safety net will be compromised. This is especially disturbing because estimates are that we will need to produce more food, not less, to feed a growing world population. U.S. agricultural producers facing a cost structure that is higher than our overseas competitors will see some of our markets disappear.

The irony of this is that U.S. producers are among the most efficient in the world. Per unit of product, our greenhouse gas emissions are among the world's lowest. Yet, we will be reducing that production while other production that is less efficient will increase, with some of that production being outsourced to Brazil, Russia, China, India and other developing countries, we would even see an increase in worldwide greenhouse gas emissions from food production.

The Farm Bureau is not opposed to a revitalized American energy policy. We want to see expanded use of renewable fuels, in particular biofuels, to help make our Nation cleaner, more secure, and more energy independent. But there is a better way than a mandatory cap and trade program that imposes large new energy costs on agriculture and the rest of America's economy.

Madam Chairwoman, the Farm Bureau stands ready to work with you and members from both sides of the aisle on these legitimate issues. If members insist, however, in imposing restrictive costly programs that will harm U.S. agriculture now and in the future, we will continue to voice our strong opposition to such an approach.

Thank you for the opportunity to testify.

[The prepared statement of Mr. Stallman follows:]

Statement of the American Farm Bureau Federation

To: Senate Committee on Environment and Public Works

Regarding: Clean Energy Jobs and American Power Act

Presented By:
Bob Stallman
President

October 29, 2009

AFBF is the unified national voice of agriculture working through our grassroots organizations to enhance and strengthen the lives of rural Americans and to build strong, prosperous agricultural communities.

Farm Bureau represents more than 6,000,000 member families across the nation and Puerto Rico with organizations in approximately 2,500 counties.

Farm Bureau is an independent, non-governmental, voluntary organization of families united for the purpose of analyzing their problems and formulating action to achieve educational improvement, economic opportunity and social advancement and, thereby, to promote the national well-being.

Farm Bureau is local, county, state, national and international in its scope and influence and works with both major political parties to achieve the policy objectives outlined by its members.

Farm Bureau is people in action. Its activities are based on policies decided by voting delegates at the county, state and national levels. The American Farm Bureau Federation policies are decided each year by voting delegates at an annual meeting in January.

My name is Bob Stallman. I am President of the American Farm Bureau Federation and a rice and cattle producer from Columbus, Texas. Farm Bureau is the nation's largest general farm organization, representing producers of every commodity, in every state of the nation as well as Puerto Rico, with more than 6 million member families. I appreciate the invitation to address the committee this morning on an issue that has generated tremendous debate.

Earlier this year, in July, I testified before this committee, outlining the concerns that America's farmers and ranchers had with H.R. 2454, which passed the House in June. Not only do those concerns remain, but S. 1733 raises new questions and concerns that I will address in my testimony.

We opposed H.R. 2454 as it passed the House, and we are similarly opposed to S. 1733. But the impacts of the legislation go far beyond just the farm and ranch community. Families will be hit hard with higher energy costs under any cap-and-trade program, an amount that could total up to $200 billion a year for American taxpayers. That will put enormous strain on family budgets.

Increased input costs will put our farmers and ranchers at a competitive disadvantage with producers in other countries that do not have similar Greenhouse Gas (GHG) restrictions. Any loss of international markets or resulting loss of production in the United States will encourage production overseas in countries where production methods may be less efficient than in the United States.

Increased production costs and lost competitiveness will result in reduced food production and higher food costs domestically and abroad. Almost a third of U.S. production is exported. At a time world population is expected to increase from over 6 billion people to more than 9 billion and the U.N. says farmers will have to produce 70 percent more food, the U.S. will actually be producing less.

Now let me deal with some of the specifics of S. 1733.

I. S. 1733 Fails to Provide a Transition to a Clean Energy Economy.

As we indicated in July, one of the major failings of H.R. 2454 was that the measure failed to provide a cost-effective blueprint to transition to a clean energy economy. S. 1733 exhibits the same shortcoming.

There are two essential components to any policy that seeks to transition from one source of energy to new sources of energy—a mechanism that removes the old source, but also a means to "plug the hole" that is left when that energy source is removed with a readily available, cost-effective new source of energy. The principal bills in the House and Senate would accomplish the first element by capping emissions of GHGs; by limiting the use of fossil fuels, such a system would necessarily result in higher prices for all consumers of fossil fuel-based energy.

However, the second essential element is lacking in both of the bills. There is little in either bill that would provide an alternative source of energy to the fossil fuels that will be lost. Americans are being asked to forego the use of coal, of which the United States has tremendous reserves, yet we are being offered nothing in its place. Each of the potential replacement sources of energy has significant problems and issues, and none of these issues is addressed in the bills.

Energy experts indicate, and advocates of cap-and-trade acknowledge, that renewable sources of energy are not sufficiently available to "plug this hole." These energy sources are in their relative infancy. In fact, there are such significant issues with regard to siting and transmission of these sources that they may do little more than be able to meet the increase in energy demand of our nation for several years. There have been well-publicized objections to the siting of wind turbines in certain areas. More recently, we have seen stories of conflicts between wind turbines and the impact on endangered species, thus underscoring the competing interests between energy production and natural resource protection. There seems little prospect that these sources of power can actually replace fossil fuels. In the case of wind power, for instance, there is general recognition that it does not have the capacity to replace base load power on the grid due to its intermittent nature.

Nuclear energy would be a logical candidate to "plug the hole" left by the removal of fossil fuels. With respect to air emissions, nuclear energy is a clean energy source and it already supplies nearly a fifth of our electric generating power nationwide. S. 1733 does nothing, however, to promote the development or use of this energy source as a replacement for fossil fuels, and that is a critical failing. Our newest nuclear generating plants are decades old. Some experts estimate that our nation will need to build 4-5 nuclear plants every year for the next 40 years to make up the energy shortfall. Yet, just earlier this week, the Nuclear Energy Institute said it is best-case scenario between now and 2030 is barely half that – 45 new plants by 2030. They have called on Congress for $100 billion in incentives to support more rapid development of the industry. We must acknowledge, too, that many of the obstacles that have been raised to stall the deployment of nuclear energy over the past several decades—costly and burdensome application and licensing procedures, lawsuits and other issues—remain. They could be streamlined and addressed in the bill, yet they are not.

In that regard, we were pleased that the Senate Energy and Natural Resources Committee included some modest language (Sections 312 and 313) in the legislation it approved this spring related to nuclear power. We hope that the Majority Leader will seek to combine the Energy Committee bill with legislation produced by your committee, but we believe that a true commitment to nuclear power goes well beyond a Sense of the Senate resolution. Congress should make an unequivocal commitment to fostering and promoting an aggressive nuclear program and ensure that cap-and-trade emissions limits are not imposed in the absence of a robust nuclear program.

In the absence of such a program, the default alternative will almost certainly be natural gas, particularly because carbon capture and storage seems unlikely to be commercially available in the near-term. The bill does nothing to promote the development and use of natural gas. There are vast untapped natural gas reserves that have thus far been off limits to development, and those reserves will be essential if natural gas will be the substitute for fossil fuel. If this is the direction that the committee wants to take our clean energy policy, then it must promote and streamline the development of those reserves.

Such an approach, however, does not come without a cost. Reliance on natural gas as the source of our energy creates particular problems for farmers and ranchers. Natural gas is the main ingredient in the production of nitrogen fertilizers, which all farmers need to grow their crops. Switching to natural gas as our primary energy source will either drive up the cost of fertilizer significantly, or worse, dry up the supply of natural gas for domestic fertilizer production to the extent that we would have to rely exclusively on imports of fertilizer in order to stay in business.

Advocates for cap-and-trade are strident in their objections to coal and the use of other fossil fuels. Clearly, they are entitled to their opinions. But it's not enough simply to be against something – you must be for something as well. A cap-and-trade program will effectively create a hole in our energy supply. It's Congress's job to "plug that hole" not simply create it. Any legislation taken up and voted upon must be realistic, straightforward and set out a cost-effective, pragmatic path for our economy and our energy future. Unfortunately, S. 1733 fails to do this.

II. S. 1733 Does Not Make Economic Sense for Agriculture.

According to the latest EPA *"Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005"* updated in 2008, agriculture and forestry emit between 6 percent and 7 percent of the total GHG emitted in the United States. The same EPA report also indicates that agriculture and forestry have the potential to sequester between 15 percent and 20 percent of total U.S. emissions. The USDA says that currently these two sectors sequester about 11 percent of total emissions, so these sectors are responsible for reducing more GHG emissions than they emit. It stands to reason that any climate change policy should seek to maximize these contributions from agriculture.

Any legislation will also impose additional costs on all sectors of the economy and will result in higher fuel, fertilizer and energy costs to farmers and ranchers. Cost increases incurred by utilities and other providers resulting from climate change/energy legislation will ultimately be borne by consumers, including farmers and ranchers. Electricity costs are expected to be one-third higher than would otherwise be the case by 2040. EPA's own estimates suggest coal costs could rise by more than 100 percent by 2020. Unlike other manufacturers in the economy, agricultural producers have a limited ability to pass along increased costs of production to consumers. It is extremely important that those costs be minimized to the greatest extent possible. Farmers are heavily dependent on the price and availability of inputs such as fertilizer and crop protection products. A productive agriculture sector requires viable fertilizer and chemical industries. The fertilizer industry has already gone through major restructuring due to higher natural gas prices and the closure of many U.S. production facilities. More than half of the nitrogen fertilizer used in the United States is imported. Another rise in natural gas prices as EPA projects would likely result from this legislation could threaten the remaining fertilizer manufacturing facilities in the United States. This would make us even more dependent on fertilizer imports.

A report released last week by Senators Kay Bailey Hutchison (R-Texas) and Christopher Bond (R-Mo.) entitled "Climate Change Legislation: A $3.6 Trillion Gas Tax" found that over the life of the House and Senate legislation, gasoline costs would increase by approximately $2 trillion and diesel costs for farmers, ranchers and others would increase by over $1.3 trillion as a result of the legislation. Producers use gas and diesel to run their farm machinery, power their operations, transport goods to market and drive their cars.

All of these additional costs will be borne by farmers, ranchers and consumers as a result of this legislation.

a. S. 1733 Fails to Provide A Role for Agriculture and Forestry in its Offsets Program.

Offsets are an important part of any cap-and-trade program. Because they are only useful to the extent they are cheaper than installing new technology, they serve as a cost-containment mechanism for entities trying to meet cap obligations. That means that fewer costs will be passed on to consumers, thus lowering the cost of compliance of a cap-and-trade program.

Agriculture and forestry are particularly well-suited to provide offsets to capped entities. Agriculture and forestry are not capped sectors under the bill, and would therefore be eligible to provide such offsets. There are a number of identified agricultural and livestock practices that have been proven to reduce or sequester GHG. These range from shifts out of conventional to conservation tillage, forest management, nutrition management, even afforestation. In order to achieve the full potential for GHG reductions and sequestration, climate policy should allow farmers and ranchers to adopt these practices to provide offset credits to capped entities. Adoption of these practices also provides other environmental benefits besides carbon reduction or sequestration. These other benefits may include reduced soil erosion, improved wildlife habitat or increased water quality, to name a few.

Unlike the House bill, S. 1733 does not specifically provide a place for agriculture and forestry in its offsets program. While the bill provides a pool of 1.5 billion tons of domestic offsets that might be available to capped entities to use in meeting their cap obligations, the bill does not specify who is eligible to provide those offsets. Rather, the bill establishes an advisory board to make recommendations to the president as to which types of offsets would be eligible under the program. While certain types of agricultural and forestry practices are included on a list from which the president may choose, the final decision is up to the president.

This uncertainty creates a number of problems both for farmers and ranchers and the offsets program itself.

Unlike the House bill, where some farmers and ranchers might recoup some of the increased fuel, fertilizer and energy costs that they will incur as a result of such legislation, S. 1733 contains no such assurances. S. 1733 places the entire offsets program in the complete discretion of the president, with no sector being assured that any of the offset opportunities they might provide will even be eligible to participate in the program. In this regard, S. 1733 takes a step backward from the House bill.

Without any assurances that they will be able to provide offsets to any market created under the bill, farmers and ranchers have no mechanism to shield them from the cost increases they will incur, and the bill wastes an opportunity to provide cost containment and environmental benefits that farmers and ranchers can supply.

The uncertainty created by not establishing an initial list of eligible offset types also adversely affects the operation of the offsets program by delaying its implementation. Providing the president with one year to determine an initial list of eligible offsets, the bill on its face delays implementation of the program by a year. But the potential delay could be much longer, because the bill creates uncertainty with investors seeking to fund offset projects. Without knowing what offset projects will be eligible for the program, investors must also wait for that determination. Instead of having a supply of offsets in the pipeline for the start of the program, offsets will not be available for at least a year.

The bill must specify that agriculture and forestry will qualify as eligible offsets. Uncertainty is not acceptable.

b. The Supplemental Program Created for Agricultural and Forestry Greenhouse Gas Reductions is Limited.

The substitute bill would create a new program to be administered by the Secretaries of Agriculture and Interior to provide financial assistance to owners and operators of agricultural lands and forestry lands for projects and activities that measurably increase carbon sequestration or reduce carbon emissions. The program would include activities on public and private grazing lands.

The program would allocate revenues from 1 percent of emission allowances in 2012 and 2013 to fund this program. Funding priority is to be given to projects that provide environmental co-benefits, and which recognize greenhouse gas reductions in operations where there are limited opportunities to achieve such reductions. Eligible projects include those that would qualify as offsets were it not for federal or state laws that preclude them from qualifying, projects that reward early adopters, provide incentives for reductions on private forest lands, prevent conversion of land that would increase emissions, and projects on federal, state or tribal lands. The program would provide for projects on federal grazing lands.

Our testimony in July indicated that certain types of agricultural producers would not be able to participate in an offsets program due to the nature of their operations and their practices, including specialty crop producers and livestock producers who graze livestock on federal lands. We are pleased to see that these two categories are specifically mentioned in this section of the bill.

This program may help some farmers and ranchers who may not otherwise qualify to provide offsets (if agricultural and forestry offsets were allowed under the bill). Livestock producers who graze livestock on federal lands would not qualify to produce offsets, but this provision might enable them to qualify for payments for carbon reduction or sequestration practices carried out in conjunction with their grazing permits or leases. Qualification for participation in this supplemental program is contingent on a number of other federal provisions that affect their ability to conduct reduction or sequestration projects on federal lands. For example, forest plans (on Forest Service land) and resource management plans (on Bureau of Land Management lands) provide the use to which land may be put and the types of activities that can be conducted on such lands. Livestock producers are also constrained by the terms and conditions of their grazing permits or leases. Current agency practice requires compliance with the provisions of the National Environmental Policy Act (NEPA) before terms and conditions of a permit or lease can be amended. Removing those obstacles could enable these producers to participate in the program.

It is unclear whether funds made available for this program will have to pay for the increased administrative costs incurred by the Department of Agriculture and the Department of the Interior to administer the program. If so, that will limit the scope of the program even further.

The program may be a step in the right direction, assuming that these producers will be able to participate. The program, however, is very limited and will not cover all of those producers who might not otherwise be eligible to participate in an offsets program. Yet, all producers will incur greater fuel, fertilizer and energy costs.

c. The Bill Fails to Reduce the Significant Economic Harm that will be Caused by Regulation of Greenhouse Gases Under the Clean Air Act by the Environmental Protection Agency.

Of particular interest and concern to us is a parallel effort heing conducted by the EPA to regulate greenhouse gases under the Clean Air Act. EPA has proposed a Finding of Endangerment and has proposed regulation of new motor vehicle emissions. Once such regulations have become final, a number of programs within the Clean Air Act automatically become applicable, many of which will severely and significantly impact agriculture.

The very low statutory threshold levels for several of these programs will result in a number of unintended consequences for all sectors of the economy, including agriculture. For example, once standards are issued under the scenario, there are a number of potentially devastating impacts that will result from application of Title V permit requirements, Prevention of Significant Deterioration (PSD) permits, and the establishment of National Ambient Air Quality Standards (NAAQS), to name a few. It is these impacts that will be felt most severely by farmers and ranchers and other small businesses.

Title V of the Clean Air Act (43 U.S.C. 7661 et seq.) requires entities that emit, or have the potential to emit, 100 tons per year of a regulated pollutant to obtain a permit for such emissions. The requirement for a permit is mandatory and always results in the imposition of a fee by the government.

Against this backdrop, USDA)stated in comments to the Office of Management and Budget:

> If GHG emissions from agricultural sources are regulated under the Clean Air Act, numerous farming operations that currently not subject to the costly and time-consuming Title V permitting process would, for the first time, become covered entities. Even very small agricultural operations would meet a 100-tons-per-year emissions threshold. For example, dairy facilities with over 25 cows, beef cattle operations over 50 cattle, swine operations with over 200 hogs, and farms with over 500 acres of corn may need to

> get a Title V permit. It is neither efficient nor practical to require permitting and reporting of GHG emissions from farms of this size.[1]

By all standards, these are "very small agricultural operations" and will include most of the farms or ranches in the particular category. USDA statistics for 2007 indicate that these thresholds would cover about 99 percent of total dairy production, more than 90 percent of beef production, and more than 95 percent of all hog production in the United States. The resulting Title V fee structure would be significantly felt on the dairy, beef and pork sectors. While some have disputed that such an outcome would inevitably result, we have seen to date no credible evidence that it could be avoided, despite protestations from some agency officials and other policymakers. Indeed, the threat is perceived as sufficiently real that legislation has been introduced in Congress to forestall such an outcome. But the issue remains that, as a result of litigation aimed at regulating automobile emissions, the EPA may well wind up imposing fees on dairy and beef cows, as well as hogs.

These are hardly the "large emitters" that proponents of the rule say they intend to target. Title V is administered by the states, and permit fees, while technically not a "tax," for all practical purposes have the same economic impact as a tax on the regulated entity. While the fee varies from state to state, EPA sets a "presumptive minimum rate" for these fees, and that rate is $43.75 per ton for 2008-2009. The Clean Air Act sets a maximum figure of 4,000 tons per year for the per ton fee, so that emissions over 4,000 tons per year will pay the same total amount. For states charging the presumptive minimum rate, the fee for dairy would be $175 per cow per year, for beef $87.50 per head per year, and for hogs would be a little more than $20 per head per year.

This one example illustrates that application of the Clean Air Act would devastate the livestock industry in the United States.

Unlike the House bill, S. 1733 does not pre-empt or limit regulation of greenhouse gases under the Clean Air Act by EPA. Thus, farmers and ranchers will be impacted much more severely by the double whammy of cap-and-trade legislation and regulation under the Clean Air Act. Livestock producers will not only incur higher fuel and energy costs, but will also have to contend with onerous and burdensome Title V permit requirements and fees every year.

III. S. 1733 Fails to Alleviate the Competitive Disadvantage that Agricultural Producers will Experience as a Result of this Bill.

Agricultural producers rely on foreign markets as sources for their products. Similarly, the international marketplace relies to a large extent on us to produce the food and fiber necessary to feed and clothe the world. The United States exported more than $100 billion of agricultural products in 2007, approximately 30 percent of production, and only the global recession reduced that number in 2008.

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[1] Letter to Susan E. Dudley, OMB from the Secretaries of Agriculture, Transportation, Commerce and Energy, July 2008.

The increased fuel, fertilizer and energy costs that will result from H.R. 2454 and S. 1733 will greatly impact the relationship of American producers with the rest of the world. U.S. agriculture is an energy-intensive industry that relies to a large extent on international markets.

These increased input costs will put our farmers and ranchers at a competitive disadvantage with producers in other countries that do not have similar GHG restrictions. Any loss of international markets or resulting loss of production in the United States will encourage production overseas in countries where production methods may be less efficient than in the United States.

The production of food and fiber in the United States is important both to the U.S. and to the world and must ensure that our producers are not put at a competitive disadvantage. As much as our producers rely on exports for their markets, the rest of the world relies on the United States for the production of their food. Increased production costs in the United States resulting from this bill will likely raise world food prices at a time when most countries cannot afford it.

Trade issues become more complicated, because any trade equalization measures seeking to "level the playing field" for our producers must also comply with our World Trade Organization commitments. Provisions such as those contained in the House bill effectively imposing border tariffs on goods from countries that do not have similar GHG restrictions will almost certainly be challenged in the WTO and are in serious jeopardy of being found to be non-compliant with our obligations. Moreover, such actions could very likely lead to retaliation.

Absent a carefully constructed global agreement that includes developed and developing economies alike, no amount of punitive domestic regulation will either affect global climate or prevent severe repercussions for the U.S. economy.

The U.S. cannot unilaterally commit to GHG reductions absent reciprocal actions by all nations. Only through such commitments can we reduce the competitive disadvantage that will beset American agricultural producers and have an impact on global climate. We believe that any bill should contain a provision that makes implementation of our legislation contingent on commitments by all nations to reduce GHG emissions. Without such a provision, we will be only hurting ourselves.

IV. Biomass Definition

In addition, we believe any legislation dealing with the energy issues and biofuels must rectify an existing failure stemming from language included in earlier legislation.

America's farmers and farm communities have been at the forefront of the biofuels revolution and have invested in growing the crops and building the facilities to turn plants into fuel. Our farmers have grown this industry while protecting the land and increasing crop yields.

In this connection, we believe legislation should be as inclusive as possible regarding energy and methods of production. Unfortunately, the Renewable Fuel Standard (RFS) included in the Energy Independence and Security Act of 2007 did not include all forms of forest biomass.

Under the standard, the only forest biomass considered renewable is that from "actively managed tree plantations."

The reason for such a narrow definition is unclear, but the result is that many family farm forest owners would be precluded from active participation. If the purpose of the standard is to increase the use of forest biomass, the definition should be as broad as possible to encourage its use.

Farm Bureau strongly objects to giving the Administrator of the EPA the authority to define sustainable practices for the production of renewable biomass. USDA is the trusted expert on issues such as soil quality and productivity, conservation issues, animal health, rural job creation and commodity pricing. The authority to define sustainable biomass production practices should reside solely with the Secretary of Agriculture.

a. Indirect Land Use Changes (ILUC)

Biofuels like ethanol and biodiesel are clean-burning transportation fuels that reduce our dependence on foreign oil and revitalize rural America. However, there are on-going efforts by some to impose stricter standards for determining the GHGs of home-grown biofuels than those of imported petroleum products. These nay-sayers base their beliefs on controversial and uncertain economic models.

The controversy stems from EPA's decision to include modeled, projected indirect land use impacts in its scoring of the GHG emissions from biofuel production and use in the proposed rule for the RFS. Essentially, the EPA has determined that the production of ethanol in the U.S. is forcing land use changes in foreign countries that destroy valuable rain forests to produce farm commodities to make up for reduced exports of these commodities from the United States. There is no credible evidence that this is happening.

Our members have serious concerns about the terms "indirect land use change" and "lifecycle carbon emissions" and how these concepts would be measured and implemented. We do not believe there is a reliable way to measure or accurately predict how the production of biofuels will affect land use change in other countries. EPA Administrator Jackson echoed that belief in her September 23, 2009, letter to Senator Tom Harkin (D-Iowa). In the letter Administrator Jackson states: "However, it is also clear that there are significant uncertainties associated with these estimates [of indirect emissions from biofuels] and in particular, with the estimate of indirect land use change." The biofuels industry cannot be expected to thrive in such an uncertain environment.

We are also concerned that American biofuels are the only transportation fuel being measured for GHG reduction. If we are going to accurately measure GHG reductions we need to accurately measure the land use change for petroleum products. This will allow us to fairly compare GHG emissions from all transportation fuels.

Farm Bureau supports language included in H.R. 2454, The American Clean Energy and Security Act, that prevents EPA from implementing the ILUC rule for six years, until the

National Academy of Sciences thoroughly and fairly determine if land use changes can be corroborated by actual scientific evidence.

Improved plant varieties, new technologies, and more efficient agricultural practices have produced greater crop yields of higher quality. It is unrealistic to think that anyone can predict how agriculture and land use will evolve in the future based on the single variable of biofuels utilization.

In conclusion, we believe agriculture and forestry can play a key role in any future national energy policy. S. 1733 fails to recognize this role and would in fact penalize the very sectors that have the best opportunity to reduce greenhouse emissions in the most cost-effective manner for all.

Thank you for the opportunity to testify, and I look forward to answering any questions.

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Environment and Public Works Committee Hearing
October 29, 2009
Follow-Up Questions for Written Submission
Questions from:
Senator George V. Voinovich

1. Mr. Stallman - Agriculture is the number one industry in the State of Ohio, generating $90 billion in economic activity per year. By placing a limit on U.S. greenhouse gas emissions and forcing emitters to purchase offsets in order to comply with cap limits, we will be driving up the price on higher GHG-emitting energy sources like coal. In response, we could see a widespread switch to lower emitting energy sources like natural gas, and if production cannot keep up with the increased demand, there is a very real chance that we could see a price spike in natural gas. As natural gas is a key agricultural input, what effect would this spike in price and demand have on Ohio's agriculture industry? Are the offsets provided in this bill enough to protect farmers? If not, what does this mean for consumers?

ANSWER: Natural gas is a key component of the agricultural energy mix, and a spike in natural gas prices would mean increased costs for farmers and ranchers – not just for energy but for other farm inputs. Specifically, natural gas is the key component in the production of nitrogen fertilizer. Switching from coal to natural gas as a source of energy would inevitably put increased cost pressures on supplies of natural gas for fertilizer production and the fuel switching would almost certainly result in a significant rise in the price of natural gas for the production of fertilizer. In a worst case scenario, it would make domestic production of fertilizer uneconomic for the few remaining U.S. manufacturers. We already import over half of the fertilizer we use. The kind of scenario outlined in your statement probably would cause the remaining fertilizer production to move overseas, so farmers and ranchers would be totally dependent on imported fertilizer. This outcome would apply to agriculture across the United States. Ohio would not be insulated, either from these cost pressures or from farmers having to make difficult business decisions about their ability to continue to produce food, fiber and fuel.

In specific response to your question, we would say that the offsets provided in the legislation are not enough to protect farmers. In our view, it is absolutely critical that a robust offset title be included to help farmers and ranchers cope with the increased fuel, fertilizer and energy costs they will incur as a result of this legislation. Offset revenues are tied to the price of carbon—offset revenues increase as carbon prices increase. But offsets are only viable as long as they are cheaper than the cost of the actions that would otherwise be taken by emitters to limit their own carbon output. When the production costs and the associated sectoral adjustments from higher natural gas and other energy sources are considered, our analysis suggests the industry will see a net decline in farm income. Going one step further and considering the potential revenue from offsets available *to those who continue to produce the nation's food and fiber*, it is still difficult to end in a positive situation for the industry as a whole.

There are a number of agricultural sectors whose practices are such that they cannot provide offsets. These include cotton producers and fruit and vegetable producers, among others. Yet, these producers will still have the same increased fuel, fertilizer and energy costs as those who can benefit from offsets.

The ultimate result will in all likelihood be a loss of cropland in the United States, with some food production moving overseas. This will occur as a result of producers who cannot bear the higher input costs or the loss of international markets that are likely to result when foreign competitors do not face the same cost increases. Less domestic production will result in higher world food prices for all consumers. Also, because we produce food more efficiently than any other country in the world, moving food production overseas will have the ironic result of actually increasing greenhouse gas emissions.

Senator BOXER. Thank you so much, Mr. Stallman, and we look forward to working with you and with Senator Lincoln as her committee takes a look at some ways we can do even more for agriculture because we have done quite a bit, but we are open.

And as you know, this bill is going to—once it gets out of this committee, and we hope that it does, we will then be working on the floor with all Members from every State in the Union to make this a stronger bill.

I wanted to mention that there is an article in the West Virginia paper today that says, “Climate bill adds more sweeteners for coal industry,” and Senator Baucus mentioned Senator Carper, I just want to say again how grateful we are to you, and Senator Baucus, to your staff, to Senator Specter’s staff, Senator Udall’s staff.

If I leave anybody out, of course, my own staff and Senator Cardin’s staff, everybody really worked together, whether they were for the sweeteners or not for the sweeteners, I have to say it is a delicate balance, and that is why, you know, Senator Baucus talks about in many ways the sweet spot, and there is as sweet spot for this committee. There is a sweet spot for the floor. There is as sweet spot for conference. It is a long road.

Let me say, Mr. Carey, you made a very eloquent case for, you know, not really changing much, and I understand that. You are very eloquent on the point. But let me tell you the problem with that. I just want to try to reach you. You point out the court didn’t say that you had to act. It said if there is a danger, you have to act.

And the EPA, under the Bush administration, we found the documentation where there was an endangerment finding made by the Bush administration, by the scientists there. It was blocked from getting out, and now we got it, we found out what it is, and it is very close to the endangerment finding they are making today with the Obama administration.

There is not a difference between the Bush administration and the Obama administration scientists on the dangers facing America if we do nothing.

Now, here is the thing, Mr. Carey and others, I am going to ask a few of you about from the business community. It isn’t as if nothing is happening. So much is happening on this subject. You know, the one-thousandth Mayor signed on to climate initiatives for their cities, meaning that the cities all over the country are acting already to reduce carbon. We have 34 States that are acting—States, you’d be surprised to hear if I read them all off to you. Every single region, many of them already, 21 participating in cap and trade systems.

So we are sitting here as if we are the be-all and the end-all. I don’t believe we are at all. We are following an amazing move. And these States are Washington, Oregon, California, Montana, Utah, New Mexico, Arizona, Illinois, Iowa, Kansas, Michigan, Minnesota, Wisconsin, Delaware, Connecticut, Maine, New Hampshire, New Jersey, Nevada, Vermont, Rhode Island, and that is just a few. And they are beginning cap and trade system.

So my question to, I am just going to just say the first two witnesses we heard from a long time ago, Mr. Chiaro from Rio Tinto and Mr. Rowe from Exelon. Would you tell us, I don’t want to make this such a softball, but I am going to try to say this. Would you agree that we are already addressing these in a State by State and in a regional way? And would it be more helpful for you to have a national law with certainty in it?

And when you answer the question, if you could tell us how many employees you have, again, in how many States. I would appreciate hearing that.

Mr. Chiaro.

Mr. CHIARO. Thank you, Madam Chairman.

We have 15,000 employees spread across the U.S., mostly concentrated in the West, but a significant number in the East as well. In terms of the cap and trade system, we certainly support a strong cap and trade bill. Something that is global is even better for us as a global company.

But the worst of all possible worlds for us would be one where there is a fragmented approach, where certain States adopt one form of cap and trade, other States adopt another form of cap and trade. Then we have to deal with multiple systems across our company. That just adds costs and complexity.

We prefer to see certainly a national system, but even better if we could work toward a global system, that is what would work best for us.

Senator BOXER. And Mr. Rowe.

Mr. ROWE. Madam Chairman, my company has 17,000 employees, most of which are in Illinois and Pennsylvania, some in Texas and a small number in New England.

Nearly every State in which we do business has adopted some measure for dealing with climate, in most cases renewable energy standards. And the renewable energy standards we see being adopted in States involve a mix of technologies which cost somewhere between $40 and the maximum I have heard is $150 a ton in your own State of California. This compares to the $28 cap you are adopting in your bill. We think $28 is a lot better than $50 or $150.

Senator BOXER. And now that Senator Specter—I just wanted to know, how many employees do you have in Pennsylvania approximately?

Mr. ROWE. I believe it is on the order of 5,000.

Senator BOXER. And are you in the nuclear business?

Mr. ROWE. We are the Nation's largest nuclear power producer.

Senator BOXER. And how many plants are you running, nuclear power plants?

Mr. ROWE. We operate 17 of the Nation's 103 nuclear power plants.

Senator BOXER. OK. Senator Alexander is such a strong advocate of nuclear power, as are many on this committee and off this committee. And I guess my last question to you is, because he has a very thought out plan about building 100 nuclear power plants. But in that plan, there would be no allowances going.

In our bill, we have, as I understand it, a half-billion dollars of allowances going to nuclear plants to help train workers and deal with safety questions. So is that not a benefit to the nuclear power industry that we have now a nuclear title to this bill, and there are others who want to make it even stronger?

Mr. ROWE. Yes, Madam Chairman. And as you know, Senator Kerry and Senator Graham are in fact discussing ways of making the nuclear title stronger.

You know, we in my company are deeply indebted to Senator Alexander, Senator Inhofe, Senator Voinovich, Senator Carper, virtually everyone on this panel for things that they have done to support nuclear. And we, too, believe that a large number of nuclear plants will be needed in future decades to support a low carbon energy economy.

The thing that makes us a small voice rather than a shrill voice is our own numbers say that at the present time, it is something like $75 per ton of carbon dioxide to use nuclear as the only solution. We think we need a market-based portfolio, and that is why we support cap and trade.

Senator BOXER. Thank you very much.

Senator Inhofe.

Senator INHOFE. Thank you, Madam Chairman.

Let me first of all say, Mr. Rowe, you are right. We do support nuclear and we look across the sea and see what France is doing and other countries, and wonder why we are not there. But hopefully we will be someday. However, our concern is what do we do today, tomorrow and the next 5, 6, 7 years?

And let me say this to Mr. Rowe. We had a USCAP hearing where we had several corporations coming in, and they testified. And clearly, Government is picking winners and losers. You are a winner. And you know, I have often said that if I were on your board of directors, I would probably be sitting down there agreeing with you right now.

The Wall Street firm Bernstein Research said, “If passed, John Rowe calculates that the bill would add $700 million to $750 million to Exelon’s annual revenues for every $10 a metric ton.” I would be right there in there with you.

Mr. Carey, you know, we keep hearing that this bill takes care of coal. That is the phrase they use. Now, if it takes care of coal, and you have just heard about the more sweeteners on its way so it is going to take better care of coal, why are you opposed to it?

Mr. CAREY. Madam Chairman, Senator Inhofe, when you look at this bill, I think there are a number of issues with CCS that are yet to be addressed. Let’s not talk about where CCS currently is, but let’s look at the issues. And if you look at page 5 of my written testimony, it is addressed to the second paragraph, which essentially that CCS is something that we need to continue to study, but to base CCS on a cap and trade scenario is the wrong answer.

We continue to need to explore this, but we also need to look at the implementation of a national pipeline, including a regulatory framework, property rights issues, general liability concerns, the impact of other environmental statutes such as the Clean Air Act, the Superfund, hazardous waste laws, and Safe Drinking Water Act.

All of these issues have been enumerated in many reports, including previously mentioned GAO and CRS reports. Those issues are not addressed in this bill.

Senator INHOFE. Yes, and I understand that, and I only have 7 and a half minutes, so let me just go on and ask you one other question.

They have said several times before and in two of the opening statements they talk about the fact that this legislation would preempt the Clean Air Act and trying to accomplish the same thing through regulations. And is that your understanding, that if we were to pass this, we would not be concerned with the EPA using the Clean Air Act for their regulations to accomplish some things that could be even worse?

Mr. CAREY. Madam Chairman, Senator Inhofe, I would say that you have two train wrecks. And just because one is going to happen, why have the other? They are both going to happen if this bill passes.

Senator INHOFE. Yes, what I am saying is, it does not preempt, otherwise you would have two after you as opposed to just one.

Mr. Stallman, I have had a lot of conversations with your people in Oklahoma, and I think they are really up in arms more, I guess, than we hear here in Washington. But let me just approach this maybe a little different way.

Senator Kerry said that this only affects 2 percent of the emitters. In other words, it is going to exempt the farmers. It is going to exempt all these people. And 2 percent of the emitters are responsible for 75 percent of the emissions of CO_2, which I don't agree with. I don't think that is the case.

But assuming that he is right, and assuming that you are exempt, why would your people and my farmers in Oklahoma oppose this bill?

Mr. STALLMAN. Well, Senator, it is accurate that we are exempt as a capped industry under the bill. That is completely right. We are not exempt from the effects of this bill.

Senator INHOFE. Very good.

Mr. STALLMAN. And fundamentally, that is what I talked about in my oral statement and what we include in our written statement of the very serious effects in terms of cost increases, and frankly, the very serious effect of downsizing American agriculture.

The EPA analysis to get to the benefits that they attribute to American agriculture have in the model an assumption that we reduce cropland acres, put it into forestry, have less crop acres, and produce less food and have higher prices. That is how they do it.

Senator INHOFE. And I think that is very significant to bring out because there is somehow, and we noticed this yesterday and the day before in these hearings, this assumption that if you are exempt, you don't have any problems. But what about the cost of gasoline, the cost of diesel, the cost of fertilizer? How much has fertilizer gone up in the last 5 years, roughly?

Mr. STALLMAN. Oh, I couldn't give you the percent, but based on my farm, I know I write a lot bigger checks than I used to.

Senator INHOFE. Yes, and of course, the main ingredient there is natural gas. This is going to cause that to go up. Chemicals, the cost of everything for doing business is going to go dramatically up. So even if you were exempt, those costs would continue, and you would like to be able to say that all those could be passed on. Some will be passed on, so the general public, my wife going to the grocery store, my 20 kids and grandkids that are eating meals, are going to be paying more, but the farmers also are going to be paying more and getting less out.

Mr. STALLMAN. Absolutely. Twenty percent of our input costs in agriculture on average are energy related.

Senator INHOFE. Thank you, Mr. Stallman.

Senator BOXER. I am going to call on Senator Specter. But before you start, please, I failed to mention the role that Senator Specter played in the soft collar that we have in the bill. I wanted to recognize his hard work and that of his staff.

Senator.

Senator SPECTER. Thank you, Madam Chair.

Mr. Winger, I have noted your testimony of when a major project was canceled in Montana because of the aura of uncertainty surrounding the regulation of carbon dioxide. On Monday of this week, I met with Building Trades in Philadelphia, including Boilermakers, expressing concerns about refineries there. You mentioned refineries in your testimony.

Do you think that in order to have the aura of certainty that we have to know from the legislation what the standards will be for carbon dioxide, as opposed to continuing the regulatory authority by EPA to regulate carbon dioxide?

I made the point earlier in these hearings that we really cannot leave it up to EPA to continue to have regulatory authority if we are to have the certainty, and that we really have to deal with the legislation. EPA Administrator Jackson testified that there were other considerations, and I said, well, present those to the committee. If we have got to deal with legislation to provide the certainty, then let us do it legislatively, as opposed to leaving EPA with regulatory authority.

Would you agree with that?

Mr. WINGER. Yes, I agree with that. The legislation will give the incentives. It will lay out the ground rules. I believe it is very important to have the legislature legislate.

Senator SPECTER. Mr. Rowe, we are concerned about many, many values here: the future of the climate, global warming. Let me focus on two, questioning you on jobs and the cost of electricity. You have talked about two key factors here, local distribution, which you would like to have with the allowances of 40 percent. The House bill has 35 percent and so does the Senate draft bill.

You also talked about the price collar, which as the Chair has pointed out, my staff and I have been working on. This is a carryover from Bingaman-Specter on the so-called safety valve. Now, when you talk about the price collar, you say you don't like 5 percent over inflation, but you would like to have a fixed price.

Now, in concern for the cost of electricity, I know this is hard to quantify because there are so many moving parts, but you serve a big part of my constituency, as noted. If you end up with 35 percent of the local allowances instead of 40 percent, part A, what will that impact be on the cost of electricity? If we end up with 5 percent plus inflation on the price collar, what will that be contrasted with a fixed price on the price collar?

You see what I am driving at? I want to know what the cost is going to be on the electricity.

Mr. ROWE. Senator Specter, first, I am grateful for your now 5 or 6 years of work on both getting cap and trade to work and also having——

Senator SPECTER. I need 6 more.

[Laughter.]

Mr. ROWE. We estimate that with the Waxman-Markey provisions, which we have been able to more fully analyze, the increase for a Philadelphia customer would be on the order of 5 percent. And we are already putting half of that into rates just for Pennsylvania renewable standards.

So it illustrates how important the combination of a price control mechanism and the allocations to the local distribution companies are.

To answer your question precisely, I will have to file it in writing, but I will do that promptly and send it to you. But the answer is very clear, a firm price collar plus allocations to local distribution companies like PECO do a great deal. They cut the cost of this bill for Pennsylvania and Illinois consumers in something like half. It is very important to your constituents and my customers.

Senator SPECTER. Madam Chair, I have one brief question for Mr. Krupp, if I may?

Senator BOXER. Yes.

Senator SPECTER. Mr. Krupp, as President of the Environmental Defense Fund, I note your support for Waxman-Markey and our favoring cap and trade. And you have heard my inquiry about having a fixed determination so that we know what the cost will be for carbon capture. Would you agree from your perspective that the desirable course for this bill is to fix it legislatively?

In the context of getting the votes here, when you have certainty, I think you will have more appeal to Senators like myself. There are a lot of considerations on my agenda, but the coal industry is one. And I think there will be a lot more support if EPA does not retain the regulatory authority to deal with this issue. Would you agree that that is the preferable course?

Mr. KRUPP. Senator Specter, you raise a couple of issues. Let me try concisely to deal with them.

I think these are very important concerns, and I completely agree with you that the cost issue is important, and the bill needs to grind down costs. I think this bill does a very good job of doing exactly that.

I think it is very important that this bill fix the ceiling of how much pollution we are going to have so we control carbon and reduce it. And I think that a price collar properly structured can give people assurances that there won't be tremendous volatility in the price. Properly structured means that, you know, there is a strategic reserve of carbon tons that is opened up if a price goes above a certain point.

So I think we can do both. We can keep the integrity of the cap and the carbon control, which is the main purpose of the bill, and answer the legitimate concern on costs. I think this bill as it is structured now does that very well. I think there are other ways that could also work.

And your second question about EPA regulatory control, I think the tighter the tap and the more the reductions, you know, the more that cap and trade can be the primary driver.

Senator SPECTER. Well, that doesn't quite answer the question. Primary is not sufficient.

Mr. KRUPP. I think for conventional pollutants, there are regulatory structures that will continue to important to protecting——

Senator SPECTER. I am just asking about carbon dioxide. That is all.

Mr. KRUPP. For carbon dioxide, yes, a cap and trade should be the primary driver. That will give industry the flexibility.

Senator SPECTER. You are still on primary. That isn't sufficient if there is some secondary regulatory authority.

Mr. KRUPP. If the cap is sufficiently tight, and if offsets have integrity to them so we are only allowing real reductions into the system, cap and trade will do the job.

Senator SPECTER. I take that as a qualified yes.

Senator BOXER. All right.

Senator Alexander.

Senator ALEXANDER. Thanks, Madam Chairman.

I am going to say this again because whenever I do, it seems that my Democratic friends don't hear it. Forty Republican Senators, and we believe many Democrats, believe there is another approach to reaching our climate change goals by 2030, even though we have a wide variety of views about climate change.

One is 100 new nuclear power plants—create the environment for that in the next 20 years. Two is the environment for electrifying half our cars and trucks. We can do that without building one new power plant. Three is offshore exploration for low carbon natural gas, as well as oil. And four is four mini-Manhattan Projects to make solar costs competitive, to recapture carbon, to make electric batteries betters, and to recycle used nuclear fuel so it doesn't isolate plutonium.

And we can do all those things without a national energy tax that is ineffective in any event on fuel, that raises costs, and that runs off manufacturing jobs.

Now, let me shift to what Mr. Rowe said was his favorite option, and I am not going to try to get you in the middle here between Senator Boxer and me. I am just going to acknowledge that under an economy-wide cap and trade like she has proposed, a company like yours, which is the largest operator of nuclear plants, is going to—well, that is an award for good behavior some people might say.

I want to look toward the future and think about your testimony and that of many others, and even this bill, which envisions that to come close to meeting any sort of ambitious climate change goal, we would have to have large amounts of new nuclear power plants.

And the concern I have is that a recent paper by the Nature Conservancy suggested that any climate change legislation be flexible enough to include nuclear power. Yet, when this legislation is combined, Senator Carper described this as a technology-neutral cap, but when it is combined with the renewable electricity standards and the other policies of the Federal Government, we suddenly see that we are not technology-neutral anymore; that our goal is not carbon, it is specific types of other production facilities, usually not including nuclear.

For example, the renewable electricity standard that you mention in your testimony and that is coming out of the Energy Committee doesn't count nuclear power, municipal solid waste or landfill gas as renewable. Seventy-five percent of the so-called renewable electricity subsidies enacted since 1978 have gone to wind developers, not to carbon-free developers.

So we have a production tax credit. Now, nuclear does have a limited production tax credit of up to 6,000 megawatts, but the way I figure it, if you build 20 percent of our power from wind, it would take about 180,000 wind turbines. That would cost about $170 billion in production tax credits. There is no cap on it for wind. There is a cap for nuclear. And if nuclear used all of its production tax credit, it would be $6.8 billion. I think my figures are about right. So it is about $170 billion to $6.8 billion.

So my question is, wouldn't it be better going forward with a production tax credit, with loan guarantees, and with the renewable electricity standard, that we had a carbon-free renewable electricity standard or a carbon-free loan guarantee with all forms of production eligible to apply, or a carbon-free production tax credit so that we allowed nuclear, you mentioned the up-rates, the 8,000 megawatts of up-rates which would come on, which by themselves about equal the total wind production we have in the United States. By up-rates, I mean just adding capacity to the existing 103 plants we have today.

So my question is, shouldn't we have a carbon-free goal for all the subsidies and tax credits, just as is proposed here, a technology-neutral cap?

Mr. ROWE. Senator, I strongly agree with you that a carbon-free goal or a carbon-free set of subsidies would be preferable to renewable-only subsidies. I think even when you level the subsidy playing field like that, you still need the cap and trade system to sort. But I ardently support including nuclear in the carbon-free package.

Senator ALEXANDER. Thank you, Madam Chairman.

Senator BOXER. OK. Let's see. Senator Cardin is next. Next after that was Klobuchar and after that is Lautenberg.

Senator LAUTENBERG. Neither one of them are on stage.

Senator BOXER. They are coming. They are coming after, correct.

Senator LAUTENBERG. OK. Thanks very much.

And I am sorry that another hearing took time because this is an excellent panel, Madam Chairman. But I am sure that there are questions that we will be able to read answers through the record.

Mr. Krupp, the Environmental Defense Fund, founding member, U.S. Climate Action Partnership, including major employers from a wide range of industries. If acting to reduce emissions would cause the kind of, forgive me, interruptions from outer space, if acting to reduce emissions would cause the kind of economic damage that our opponents claim, what do you think companies like DuPont and Ford and BP, why would they support it if it is so wrong in terms of its impact on our society?

Mr. KRUPP. Senator, I don't think there is any chance that they would support it if they believed that. Their analysis is quite different from some of the testimony that we have heard today. And in the joint statements that we have signed onto with them, their statements are that they believe on the contrary that this legislation will yield a real economic growth in this country.

And you know, if you look back at the Clean Air Act, the sulfur amendments, and many other pieces of environmental legislation where there were similar scare stories and fear mongering, there wasn't business support for them to the degree that there is today for this. And even so, the legislation turned out to be very cost effective.

Here, we have an unprecedented level of business that is supporting this legislation because they think it is good for the American economy.

Senator LAUTENBERG. Many companies that are part of the U.S. Climate Action Partnership, they were able to grow quickly over the past decades despite reducing their emissions dramatically. Dow Chemical, for example, reduced its emissions by 22 percent below 1990 levels.

Do you believe other companies across the economy might be able to achieve significant growth with the improving efficiency?

Mr. KRUPP. I absolutely agree. And the part of the story, Senator, that I think is worth mentioning is that Dow and DuPont saved billions of dollars while growing and reducing emissions, because in reducing emissions, they found dramatic cost savings as well.

Senator LAUTENBERG. For Mr. Kempton, there is a great deal of energy potential off our shores, but not all energy is created equal. What is a better option for creating jobs, reducing pollution, protecting existing fishing and tourism, with offshore wind energy or offshore drilling? Which of these?

Mr. KEMPTON. I haven't personally done an analysis of jobs in those two industries. But generally, you have a good deal more energy coming out of a single installation, which I think would lead to fewer number of jobs. Of course, there are no issues with pollution affecting fishing and so forth from wind. There are very few liquids and oils in there, mostly mineral oil. So I think the oil industry has got a pretty good record recently, but there is a possibility of spills that would affect fisheries.

Senator LAUTENBERG. And Mr. Krupp, clean energy jobs aren't limited to manufacturing and installation positions. But we need engineers to design products, train operators, truckers that ship materials to the factory, to the market, and many other jobs that support industry.

What kinds of jobs might you describe that are created in the supply chain when clean energy companies are created? What kind of jobs should ensue?

Mr. KRUPP. The word I would use, Senator, is American jobs, because they are not green jobs. They are not exotic jobs in the spacecraft industry. They are people in machine shops who used to make automobile parts are now being hired in Indiana and Ohio to make wind turbines and other bolts, nuts, fasteners. These are not some different types of jobs. These are American jobs at American plants. And these companies very much want this legislation to pass.

Senator LAUTENBERG. Confirming that view, an Italian company just opened up, just broke ground in New Jersey to build solar panels. It will employ 300 people coming from other countries to create jobs in our country on behalf of—sorry, thanks.

Senator BOXER. Thank you very much, Senator.

Senator Bond isn't here, so Senator Voinovich is next.

Senator VOINOVICH. I was interested in hearing, Mr. Winger, your testimony and then Mr. Carey's testimony. One of the things that we have to recognize is that many of the people that are supporting this legislation are opposed to fossil fuel. And the Sierra Club brags about the number of plants, coal plants they have closed, even though their integrated gas combined cycle, as you know, they are the best plants that you can get, but they are shutting them down. They are fighting one right now in the State of Ohio.

So they are pushing very, very hard, and so are a lot of other people, so that we are going toward wind and solar, failing to mention to the American people that wind and solar in terms of providing our energy is about 1.4 percent, maybe 1 and a half percent, and that they are not baseload generation. But the feeling is somehow through solar and wind, we are going to replace coal. We are going to replace gas and other things.

And I think the problem, one of the worries that you have is that the technology available for CCS is not around the corner. I wish it was. And what people should realize is that the CCS technology, if we don't jump start it, we are in big trouble because China is putting on two coal-fired plants a week. And so this idea is that somehow we will all switch to wind and solar, the rest of the world is not doing that.

And I would like you to comment about the fact that your concern about this, and as the allowances disappear, the fact that many of these companies are going to switch to natural gas, which in itself has about half the emissions as coal.

Would you like to comment on that?

Mr. CAREY. Madam Chairman, Senator Voinovich, yes, I would love to comment on that. And the answer is you are right, and also thank you for your years of service in Ohio. We definitely have a friend, and we appreciate your years of service.

But as far as the coal industry goes in Ohio, you know, we are looking at 3,500 jobs, and we are talking about American jobs. We are talking about well paying jobs, $65,000 a year. According to EIA, 80 percent of those are gone by 2030. I think that is a real hit to the Appalachian economy. There are 7,500 coal miners in the State of Pennsylvania, the multiplier 11 that is, you know, 77,000 jobs that would be immediately hit; 80 percent of those gone by 2030. The State of West Virginia, there is close to 20,000 coal miners.

This bill is bad. China and India and the developing world want us to pass this legislation because they know that we cannot have baseload generation and growing baseload generation——

Senator VOINOVICH. Can I interrupt a minute? Also, I want to clarify something.

Mr. Winger, you have been in the business for a while. When we passed the acid rain provisions of the Clean Air Act, there had been about 15 years of research on NO_x, SO_x and mercury reduction. And some allege that what we have today is, you know, we are going to be able to take care of the greenhouse emissions just like we did the acid rain provisions of the Clean Air Act.

Would you like to comment about where the state of technology is compared to greenhouse gases as it was to NO_x, SO_x and mercury many years when we put that provision in?

Mr. WINGER. I believe that the technology is not there yet. I believe that without this bill, without the subsidies or the incentives to move forward on carbon capture, that without requiring something to be done, then we will never get there. And the reality of it is coal has to be part of our energy mix.

Senator VOINOVICH. Right. And what you are saying is that there has to be a lot of money in here to jump start the clean coal technology so that we can continue to burn coal and your boilermakers can continue to have work. Right?

Mr. WINGER. Yes. Right now, we are at a standstill. If you want to talk about loss of jobs, we are not building any power plants right now because of the uncertainty.

Senator VOINOVICH. And the lobbying by the Sierra Club and others that don't want fossil fuel.

Mr. Rowe, nuclear, you and I had a talk about nuclear, and the feasibility of nuclear coming on to the degree that is anticipated in this bill in 2020 and 2030. What is the possibility of having that number of nuclear power plants?

And last but not least, what do you think of the natural gas title that is in this bill that encourages the use of natural gas? My feeling is that what it will do is take the pressure off going forward with nuclear and getting the carbon capture technology that we need for coal.

Mr. ROWE. Senator Voinovich, as I said in your office, I believe that the six or eight units that are supported by the existing Federal loan guarantee program will go forward and be in operation by 2020. I do not think there will be a significantly larger number than that.

If those units are successful, I believe there will be more online by 2030, but as I told you in your office, I doubt that it will be many tens, let alone a hundred. And as your question implies, the economics of new nuclear at the present time are haunted by the fact that natural gas is and appears likely to be for the next decade at very low prices.

And so the low cost solution for the next decade is often natural gas, and that takes, as you say, pressure off to work on either new nuclear or the more advanced forms of renewables that others like.

Senator BOXER. Thank you very much.

Our next Senator is Senator Klobuchar.

Senator KLOBUCHAR. Thank you very much, Madam Chairman.

Thank you to all our witnesses. I know it has been a long morning.

I just wanted to first comment, when I had to go to another hearing with the NTSB, when I left, and I know it has been continuing. For our C-SPAN viewers, I want them to know that despite legitimate concerns from everyone about changes they want to see to this bill, that there is some growing bi-partisan support in this country to do something about climate change.

And I just thought for a refreshing moment, I would read a few paragraphs before I ask my questions, from the recent opinion piece written by Senator Lindsey Graham, a Republican, well known Republican of South Carolina, a Senator, and Senator John Kerry.

And in their piece, they said, "We refuse to accept the argument that the United States cannot lead in the world in addressing global climate change. We are also convinced that we have found both a framework for climate legislation to pass Congress and the blueprint for a clean energy future that will revitalize our economy. Our partnership represents a fresh attempt to find consensus that adheres to our core principles that leads to both a climate change solution and energy independence. It begins now, not months from now, with the road to 60 votes in the Senate."

And they then conclude, "The message to those who have stalled for years is clear: killing a Senate bill is not success. Indeed, given the threat of agency regulation, those who have been content to make the legislative process grind to a halt would later come running to Congress in a panic to secure the kind of incentives and investments we can pass today. Industry needs a certainty that comes with congressional action."

So I just thought that was an interesting thing to put on the record, Madam Chair, and to remember that there is some bi-partisan work going on here. And again, this bill, whatever bill we pass through the committee as you all know will not be the end. There is going to be significant work going on with many on both the Republican and Democratic side. And I think there are some people like Senator Graham who truly want to get something done here.

So my first question, actually to follow up on Senator Voinovich, one of the assumptions in this bill is that there will be more nuclear reactors. I personally believe that nuclear is part of the solution here, as are more short term solutions like energy efficiency and solar and wind.

And I will toss it open to whoever wants to answer this, but what do you believe are the incentives that we need to have in here to get the 115 or so nuclear plants up and running in the coming decades?

Mr. Rowe.

Mr. ROWE. Senator, I think there are a group of things that are necessary. First, supporting at least uprates, or better yet, as Senator Alexander suggested, new nuclear plants as part of a low carbon energy package would have a positive impact.

A legislative finding that onsite storage or surface storage of spent nuclear fuel is an acceptable long term solution to the nuclear waste issue would be an important step. Obviously, increasing amounts of loan guarantees would be valuable.

The challenge for someone like me who deeply believes in markets is how to suggest subsidies without looking like you are trying to have it both ways, which one usually is. And to me, the only answer is we have to look at some long-term things like solar, like a next generation of nuclear, as things we want to get jump started, but we don't want to go too far so the market ultimately makes the choice.

As many people here have suggested, what we are ultimately looking for is to include the cost of climate protection into the marketplace, and then let the marketplace make choices from decade to decades that none of us are wise enough to make today.

But those would be the principal things I would suggest we look at to make certain that nuclear has a chance to participate in those solutions.

Senator KLOBUCHAR. Thank you.

Mr. Krupp, my last question for you is that just looking at how we can get people energized and be part of the beneficiaries of this bill I think is key. I know in our State, we were able to pass one of the most regressive, aggressive renewable electricity standards in the country, agreed to by Xcel, our biggest energy company, 25 percent by 2025; 30 percent for Xcel.

And part of that I think passed nearly unanimously in our legislature, signed into law by a Republican Governor. And I think part of that was that people felt that they could have a piece of the action, whether it was farmers with the biofuels, which was, of course, a separate bill, but incredibly helpful for jobs in our State; or whether it was some of the small towns that could see some benefit of small wind.

Could you just briefly address what you see as some of the advantages of moving forward to get that kind of grassroots support and how we can do that with this bill?

Mr. KRUPP. The amazing thing about the carbon issue, Senator, is that there are so many opportunities for people to contribute to the solution that cap and trade system, a market system gives them those opportunities and engages them. So for instance, you mentioned farmers. Farmers can move to no-till agriculture, earn offset credits. They can capture animal waste and capture methane and pay for the costs of that capture. They can generate electricity from methane that they capture.

There are so many things. Farmers can reduce nitrogen loading to more precisely control what the plants need and get an offset from that potentially under a bill like this, you know, once the process, whatever regulatory process is established.

So there are lots of opportunities for people to benefit.

Senator BOXER. Thank you so much, Senator Klobuchar.

Senator Barrasso.

Senator BARRASSO. Thank you, Madam Chair.

Mr. Stallman from the American Farm Bureau, you just heard an answer there. Is that something that you would agree with from the standpoint of agriculture?

Mr. STALLMAN. Well, absolutely, and we worked very hard to get the amendment put into the House bill that set up a structured agriculture offset program run by the USDA, with specificity as to what would constitute offsets and other rules in place that gave us some certainty. That is why I said we still really need to do this in this bill.

It does give farmers opportunities. We are very low emitters as an industry, 6 to 7 percent of carbon. We have the ability to sequester up to 20 percent of the carbon that we emit in the United States, and that is positive.

The fundamental question, though, is are the benefits that farmers achieve, the sequestration, and through selling these offsets, if you will, is that going to offset the additional costs? And then the corollary to that is: Are forestry offsets going to downsize American agriculture in terms of taking crop land out of production?

Senator BARRASSO. I hear from my farmers and ranchers in Wyoming and they have concerns about higher energy costs, fertilizer costs facing the agriculture community. So I want you to spend a little bit of time, if you could, just talking about some of the problems that our farmers and ranchers are facing and what we should really do about it.

Mr. STALLMAN. Well, it is clear that energy is important to us as an input cost. Roughly 20 percent of our input costs are energy-related. As energy costs go up, that puts a very high burden on us. Farmers cannot pass through those costs in terms of the price for the commodities they get. So that, in and of itself, is going to put a real cost price squeeze on farmers.

In fact, you know, over time it will probably cause a adjustments in production because you have to be economically sustainable to remain in production. And so one of our biggest concerns is this energy gap that we keep talking about, and how are we legitimately going to fill this hole in energy, and then specifically, you know, what happens with natural gas, because that is so important to our fertilizer costs specifically.

Senator BARRASSO. Mr. Carey, you talked about different areas of the country. California, the West Coast, the Northeast is doing well under the cap and trade regime, or regimen. Most States and regions do not. And so I look about what is happening in coal producing areas, Ohio, West Virginia, Kentucky, Wyoming. Where do those folks go, and what do they do if some of these jobs are eliminated? And you yourself have said these are very good paying jobs.

Mr. CAREY. Madam Chairman, Senator Barrasso, you know, the question is a good one. Where do they go? And quite frankly, if you are looking in Appalachia, Ohio or West Virginia or Western Pennsylvania, they simply have nowhere else to go.

One of the things that I say in my written testimony, as well as my oral, is the fact that one of the things that coal mining families own is their home. And who is going to buy that home if the jobs aren't going to come into Eastern Ohio, Western Pennsylvania and West Virginia?

Senator BARRASSO. I think you stated that some of the coal mining jobs were paying $25,000 a year higher than the average income in Ohio.

Mr. CAREY. Again, Senator, yes. That is exactly right, and when you look at the region, as Senator Voinovich knows, when you look at the region of Ohio where those coal mining jobs are located, these are higher, way above the 25 percent higher that it is in the State average. It is much higher than that. These jobs in Appalachia, in Kentucky, West Virginia, your home State of Wyoming, Ohio—they are some of the best paying jobs in their region, period.

Senator BARRASSO. And it is not just the specific income dollars. You are talking about health benefits, retirement, long term. I mean, what I see is the number of people who want to get their sons and daughters into these jobs as well because it is a good way to be able to raise a family, put bread on the table, and clothing on their back, get good educations for the kids, and opportunities.

Mr. CAREY. That is right, Senator.

Senator BARRASSO. All right, thank you.

Thank you, Madam Chairman.

Senator BOXER. Senator Carper.

Senator CARPER. Thank you, Madam Chairwoman.

Some of our witnesses have talked today about predictability. Some of our colleagues have spoken about predictability as well. And I want to direct a question, if I could, to Dr. Kempton, with a little twist on predictability, if I might. But as we know when we are interested in harnessing the energy of the sun, the sun doesn't always shine. Wind doesn't always blow.

My recollection, though, is that when it comes to offshore wind, there is actually better predictability. It is more consistent, more predictable than onshore wind. And want to ask you, is that correct? And second, if it is, do you know some ways that we can store some of the energy that we are harnessing or prepared to harness off of our shores?

Mr. KEMPTON. Yes, Senator Carper. We have studied 20 years of NOAA buoy data, which gives us wind resource data from Maine, really, to Florida, and looking at that whole system. The wind blows enough to produce electric power 85 percent of the time.

There are a couple of comments about wind not going all the time. And if it is on 85 percent of the time, it is off 15 percent. But every power plant is like that. There is nothing different about wind other than the numbers and the amount. A typical coal plant has an unscheduled outage rate at about 5 percent. So the electric grid is set up for power plants which are sometimes off and they are sometimes off when you don't expect them to be.

So one way of dealing with the predictability is larger grids, larger electric grids. In particular, for offshore wind, we have modeled an electric grid running along the continental shelf. It is not on anybody's property. It can just be reeled down by a cable-laying vessel. And there are companies that are interested in doing this. It would be part of the whole infrastructure.

When you do that, the wind stays at a medium value most of the time. So it is actually highly predictable and that is because on the East Coast, storm fronts tend to move north to south. So you put a north-south cable in, you have the wind blowing somewhere all the time. In 5 years, the wind never stopped blowing, literally. So it is not really an intermittent resource when you do that.

Now, storage you referred to as another way of dealing with fluctuations in wind. That will be important. I think ultimately it will be sometimes long wind, low wind period or high load periods you may want to burn fossil. But long before you get to that point, the electric vehicle fleet, which I think most automakers have shown they believe is coming by the models that they have announced for the next 2 years, is a very large storage resource.

So in Delaware, for example, that one big wind farm, 400 megawatts, that could be leveled out by 5 percent of the vehicle fleet being electric, with the ability to draw in power when there is excess wind, and put it back out when there is not, so-called vehicle-to-grid technology developed at the University of Delaware.

Senator CARPER. I have heard of that. I can say for the audience and for my colleagues, the most fun I have ever had driving a car. Was it a Scion? A Scion that had been retrofitted to be an electric vehicle, and I took Congressman Mike Castle for a ride and we almost never wanted to come home. It was more fun than you can imagine.

All right. I have another question in terms of jobs, and we talked earlier about the jobs that will be coming for plug-in electric vehicles in a former GM plant in Wilmington, Delaware. But just talk, if you will, about the kind of jobs that might flow from a project, a wind project off of our shores. You talked about the potential of ships laying cable, you have folks that are going to be building components for windmills, for windmill farms. Can you talk a little bit about the kind of jobs and the number of jobs that might be created for a project like this? And could something like that be, say, replicated up and down the coast or maybe even in the Great Lakes?

Mr. KEMPTON. Yes. Senator, the kind of easiest quick wind resources using existing technology are off of the East Coast, really the whole East Coast, and parts of the Great Lakes. A little bit of California, but we will need deeper water platforms for the middle of the Great Lakes and for most of California, or the West Coast.

Jobs, as I mentioned, for that one wind farm in Delaware, it is 500 construction jobs, about 75 long term operations and maintenance jobs which include three boat operators or three boats' mechanics, power traders and so forth.

Now, if we built out the whole resource that I mentioned, we have estimated about 20,000 direct jobs in manufacturing, plus the installation jobs. And then four times multiplier for indirect jobs. So it really would be a very large industry.

Senator CARPER. My time is about to expire. I want to ask one quick question, if I could, of Mr. Chiaro.

Madam Chair, could I ask unanimous consent for one additional minute please?

Senator BOXER. Yes, but I just want to announce on the next panel, we are going to have to keep our questions to 4 minutes. Go ahead.

Senator CARPER. Mr. Chiaro, and thank you, Dr. Kempton, for those responses.

Do you believe, and answer this just briefly, do you believe the bonus allowances for coal, with CCS, in the Chairman's mark would make coal more competitive when the price of carbon is low?

I will say that again. Do you believe that the bonus allowance for coal, with CCS, and it is in the Chairman's mark, would make coal more competitive when the price on carbon is low, say under $20?

Mr. CHIARO. Yes, absolutely. In fact, I think it is essential, particularly when the price of carbon is low.

Senator CARPER. All right. Thanks so much.

Thank you, Madam Chair.

Senator BOXER. Thank you.

Then we will go to Senator Udall.

Senator UDALL. Thank you, Madam Chair.

There have been several things that have been mentioned about agriculture, and I would like to talk a little bit about, Mr. Stallman, agriculture in the West and the Southwest. You know, we plan to continue improving this bill for agriculture. We have increased allowances for rural electric co-ops, agricultural programs. We have increased domestic offsets in this bill.

And I believe that preventing severe global warming is critical to protect agriculture in New Mexico and the Southwest. Basically, the science says if we don't act, our climate will shift 300 miles to the south. And if you know the geography out in the West, 300 miles to the south for New Mexico puts us in the middle of the Chihuahuan Desert.

And so here we are, this is just conservative business as usual in the middle of the Chihuahuan Desert in 2050. So you can imagine, no snow pack, less water, bad conditions for agriculture. I mean, this really doesn't help agriculture.

So I really see the way forward for agriculture is being aggressive, is putting in place this pollution reduction bill, and moving forward with climate change legislation along the lines, and that is why I want to turn to Professor Kempton now, where we are developing these other resources.

You know, you have done, Professor Kempton, significant work on the potential for offshore wind energy to provide significant energy to coast areas. How much of this vast resource is it realistic to achieve in the near term and long term with or without national legislation to put a price on carbon emissions?

Mr. KEMPTON. I think without some kind of legislation that introduces a price like that, it would be limited to develop. There are some other policies that help. Delaware did have a local carbon emissions law and renewable portfolio standards, which you have advocated, of course, Senator Udall, and the protection tax credit which applies to both wind and nuclear right now.

These are all things that help. But I think we are going to see a fairly limited amount. We have about 1.2 gigawatts now announced. That is 1,200 megawatts. That is already operating in Europe. Europe is looking at scale-up with under construction 4,000 megawatts, and then a plan for 2015 of 36,000 megawatts. So that is exponential growth in that industry, and they are training tens of thousands of workers to do that, building installation vessels and so forth. That cannot happen without this kind of law to introduce some kind of incentive.

Senator UDALL. So, Professor Kempton, really what you are telling us is without a strong, and I think Fred Krupp and others have said this, without a strong price signal, we are not going to move into these areas aggressively and develop these kinds of resources.

Mr. Chiaro, your company is a large energy intensive mining company with vast assets around the world, including a minority interest in an active copper and gold mine in Southwest New Mexico. With that perspective, I believe our panel should listen closely to your testimony as a company that welcomes Federal climate legislation.

Could you describe how your company makes investment decisions about whether to invest in one country or another? And why you don't see this legislation as a negative for your investments in New Mexico or elsewhere in the United States?

Mr. CHIARO. Thank you, Senator, for the question.

We make investments over the very long term. Many of our operations last 30, 40, 50 years. We have operations in Utah, for example, that have been running for more than 100 years. So we have to take a long term view.

And for us, investment certainty is key in our decisionmaking process. Having multiple systems or systems that aren't settled is, as I said earlier, the worst possible world for us. We need to know what the rules of the road are because we make investments that amount to billions of dollars when we set up a large operation. And knowing what, you know, sort of the field of play in advance is essential to making good investment decisions. They are always based on NPV, on net present value. That is what we look for is value for our shareholders. Stability in terms of government regulation is vital for us wherever we invest around the world.

So that is one of the principal reasons why we are asking for a broad based market based cap and trade system. Market-based systems are things we work in all the time. Commodity prices fluctuate all over the place. We know how to deal with that sort of volatility. We can certainly manage that with a cap and trade system with carbon as well, but it is a system that we are quite familiar in working with.

Senator UDALL. Thank you very much, and thank you to the entire panel. I think this has been a very helpful panel today, Madam Chair.

Senator BOXER. OK. Well, I think what we are going to do, since Senator Whitehouse said he was not going to ask any questions, is go to our final questioner, and that is Senator Merkley. And then after that—I just want to say in advance, because I won't say it later, thank you, each and every one, for this amazing education you really gave to all of us. And I think we are all the better for it, all of us, regardless of where we come out.

So I want to thank you in advance. The reason I am doing that is when Senator Merkley finishes, if you could go out quickly because it is quarter to 12. We have another panel waiting, and we want to get to hear them as well.

So this has been fabulous. And Senator Merkley, you are a good one to end the questions.

Senator MERKLEY. Thank you very much, Madam Chair. I will dive right in.

Mr. Stallman, you made reference in your written testimony that the Senate bill is missing the list of offset practices for farming and forestry. And there is a list, but I wanted to clarify whether you saw that list. It is a 3-page list, page 534 to 536. Can you explain a little bit what the difference is that you see between the list in the Senate bill and the list in the House bill?

Mr. STALLMAN. Well, certainly, and it is not just in the list that I was referring to. It is in the program itself. The House bill has a very much more structured program with USDA authority to implement it. And this bill is much vaguer, leaves the implementation of offsets, frankly, up to the President through an advisory committee. We think that creates too much uncertainty.

What we are saying is the list is necessary. Who runs the program? You know, the requirement to run the program and provide those agricultural offsets is very important, and that is what we say is missing.

Senator MERKLEY. Great. Thank you. That is helpful, and if after the hearing you all have any suggestions for how this list needs to be amplified, I certainly would be interested. As I read through it, it was like, well, that covers everything I could think of, but I am not a farmer. And so any feedback would be very helpful, and I appreciate your comment.

And then Mr. Krupp, I wanted to turn to the broad structure here. We are already about 8 and a half percent below the 2005 levels in carbon dioxide. So would it be fair if we are zeroing in, if you will, on 9 percent, is it reasonable for me to characterize the goal embedded in this bill of 11 percent additional reduction over the next 11 years by 2020 is really a 1 percent per year goal, that that is about what we are aiming for here?

Mr. KRUPP. Yes, I think that is a reasonable characterization, Senator.

Senator MERKLEY. Well, I think of it that way, and then I look at the McKinsey study that you cite in your testimony that says that we could close this entire gap, the 2020 goal, with just energy efficiency. I look at that and then realize that in addition to energy efficiency, we have renewable energy in this bill. We have offsets in this bill. We have international offsets in this bill. It starts to look like a fairly easy target to meet.

And I don't want to characterize your testimony, but it sounded like that was the gist of the point you are making, that this is a reasonable, easily reached; this is not something that lifts up the American economy and kind of shakes it by the shoulders.

Mr. KRUPP. Senator, my belief is this is a very modest target. It is ambitious but easily achievable because there are an abundance of alternatives. My own personal belief is that if we get going, the price of carbon will be much lower, and the scientific need will continue to develop, and you will be here in a few years' time with the confidence on a bi-partisan basis to lower the cap, just as George W. Bush did with acid rain. He implemented the CAIR regulation and lowered the sulfur cap by 70 percent.

Senator MERKLEY. One of the things that keeps coming up where I feel like they are ships passing in the night is some folks refer to the standards set in this bill as an economy-wide cap, and others note that it affects only a modest number of entities in the United States.

Senator Kerry has referred to 7,500 entities, including not just manufacturers, but energy producers and so forth. The Duke University study that is in your testimony says only 1.3 percent of manufacturers are affected. That is 4,500 out of 350,000, and that is because of the 25,000 tons per year per facility standard.

So how do we reconcile these ships passing in the night and try to get us all on the same vision of what is actually in this bill? Is it economy-wide, or is it really affecting only a small percentage of producers of carbon dioxide?

Mr. KRUPP. The good news, Senator, is that because such a small number of producers produce the bulk of the economy's emissions, it can be both something that addresses the vast majority, over 80 percent of the economy's emissions, but be very selective on only a relatively small number of producers.

Senator MERKLEY. Thank you.

And finally, I am 13 seconds, one reason why it makes sense not just to use the McKinsey study and invest in efficiencies, but do to cap and trade, is to unleash the creativity of the ideas that will attack carbon dioxide and other global warming gases from every direction. And can you just close on your thoughts on that point?

Mr. KRUPP. When we create the right incentives, American entrepreneurs, American ingenuity will explode at this problem from every direction, and things just like in acid rain that we haven't even imagined yet. Right now, those incentives are all misaligned. So just watch what happens when we have the faith to give American capitalism a crack at this problem.

Senator MERKLEY. Thank you very much.

And thank you, Madam Chair.

Senator BOXER. Thank you so much.

And you said American capitalism—there is someone in the audience named Brook Byers. I would ask him to stand for a second. He is with one of the most respected venture capital firms in Silicon Valley that funded Amazon and Google. And he is just here to watch us in our work, which is a little bit more convoluted than his making a decision of, yes, I think this is a good idea; let's invest in it. We have to go through a little more of a process than that, but we are very happy that you are here with us.

So thank you, thank you, panelists. We cannot say thank you enough, and we ask the next panel to come forward on transportation. The first panel to leave as quickly as you can. You have been generous. And if anyone needs to talk to the first panelists, I am sure they will be willing to talk with you outside the door.

Thank you, ladies and gentlemen. Now, where is Hon. Sherwood Boehlert? Senator Inhofe and I were just discussing how happy we are that you are here. And we have William Millar. And we are going to start with Hon. Sherwood Boehlert. I will wait until everybody settles in.

STATEMENT OF HON. SHERWOOD BOEHLERT, CO-CHAIR, THE BIPARTISAN POLICY CENTER'S NATIONAL TRANSPORTATION POLICY PROJECT

Mr. BOEHLERT. Thank you, Chairman Boxer.

Senator BOXER. Why don't you wait one more minute until we are really cleared of the people in the room who are leaving.

And now everyone, this is a very important panel on transportation and the impact of this bill on transportation. So please, you have 5 minutes, Congressman Boehlert. Please go ahead.

Mr. BOEHLERT. Thank you, Chairman Boxer and Ranking Member Inhofe, two friends of long standing.

First of all, I would like to submit—oh, and Senator Carper, a classmate.

Senator CARPER. Three from the class of 1982 right here.

Senator BOXER. How about Senator Lautenberg?

Mr. BOEHLERT. And Senator Lautenberg. It is nice to be among friends.

I am here on behalf of the Bipartisan Policy Center, which was founded by four former Senate majority leaders: Tom Daschle, Bob Dole, Howard Baker and George Mitchell. BPC's mission is to develop and promote sound policy solutions that can attract public support and political momentum to achieve real progress: two Democrats, two Republicans on opposite sides of the political divide working in common cause. I think the American people are hungry for more of that.

I am one of four co-chairs of the Bipartisan Policy Center's National Transportation Policy Project. The others are your former colleagues Slade Gorton, former Congressman Martin Sabo, and former Detroit Mayor Dennis Archer.

Let me start by commending you, Madam Chair, for the introduction of S. 1733, which will ensure that the Senate addresses an issue that some would rather ignore. Although we have witnessed opposition to it, a cap and trade approach, while not a perfect policy, represents the best option for achieving necessary reductions of greenhouse gases in a timely and a cost effective manner.

A climate bill must have elements of both price and emissions certainty. As a co-chair of the NTPP, I strongly applaud efforts undertaken in this bill that emphasize investment in the transportation sector and situated as both central to the reduction of greenhouse gas emissions and to improvements in energy security.

Our report lays a framework for Federal transportation policies that are performance driven, linked to a set of clearly articulated goals, and held accountable for results. This committee has the unique ability to bring transportation, energy and environmental issues together as has been done in this legislation. And I hope this integration continues with the upcoming transportation authorization bill.

Let me highlight some of the transportation elements of this bill that are directly in line with the recommendations of the NTPP. Setting aside funds from a cap and trade scheme for investment in transportation, as this legislation does, is critical. However, revenues set aside for transportation in this bill are below the portion the sector should receive based on its contributions to climate change. Given that the transportation sector contributes approximately one-third of greenhouse gas emissions nationally, it should bear an appropriate burden and receive a commensurate portion of carbon revenues.

Second, the bill addresses both the environmental protection and energy security aspects of transportation simultaneously, thus integrating what have historically been thought of and addressed as separate policies.

Third, by devoting a portion of transportation grants to investments that will reduce greenhouse gas emissions, this legislation establishes an over-arching and specific national objective for transportation investments with climate revenue. This concept of a national vision and goals, but local planning and strategies, is exactly how we should be approaching Federal transportation investments.

Competitive grant programs are essential for encouraging innovation as well as flexibility at the State and local level. NTPP recommends two competitive grant programs, and we note that the

CLEAN-TEA competitive grant program embedded in this legislation is a competitive program focused on reducing greenhouse gas emissions.

It is a step in the right direction that this bill thoughtfully calls for collaboration among Federal agencies in updating and regulating the collection of data. With few exceptions, the transportation planning processes that currently exist at the State and metropolitan levels do not support a strategic performance based and accountable approach to decisionmaking. These planning processes must be refined.

Let me wrap up by offering some suggestions. Transportation funding should not be awarded for demonstrating reduction in greenhouse gas emissions alone. Investments must also demonstrate progress toward mutually beneficial goals. Although we want to reduce emissions with these investments, at the end of the day, they are investments in transportation.

We are convinced that mode neutral funding leads to greater system efficiencies and innovation. While some may be convinced of the relative promise of particular transport options or strategies, no particular mode represents the best solution to all problems in all situations.

Madam Chair, I see my time has expired. I ask permission to include several reports in my testimony.

Thank you so much.

[The prepared statement of Mr. Boehlert follows:]

Statement of Sherry Boehlert
On behalf of the Bipartisan Policy Center
Before the Committee on Environment and Public Works
United States Senate
October 29, 2009

Good morning and thank you Madame Chairman and Ranking Member Inhofe. I commend you and members of the Committee for holding this hearing. I am pleased to appear before you this morning and very much appreciate the invitation.

I am here on behalf of the Bipartisan Policy Center (BPC), which was founded by four former Senate majority leaders, Tom Daschle, Bob Dole, Howard Baker and George Mitchell. BPC was created to help provide the motivation and infrastructure to forge the bipartisan consensus we believe is necessary for durable change across a range of difficult policy challenges. The model of principled, bipartisan compromise we pioneered with the National Commission on Energy Policy (NCEP) and later with the National Transportation Policy Project (NTPP) came to serve as the founding projects for the Bipartisan Policy Center. I am speaking to you today as one of four NTPP Co- Chairmen: myself, your former colleague Slade Gorton, former Congressman Martin Sabo, and former Detroit Mayor Dennis Archer. Your current colleague, Senator Mark Warner, was an original Co-Chair before stepping down to join you in this august body. Aside from its Energy and Transportation projects, the BPC also has conducted projects that address a broad suite of other issues, including: national security, agriculture, health care, financial services and science. The BPC's mission is to develop and promote sound policy solutions that can attract public support and political momentum to achieve real progress.

Climate Legislation

Let me start by commending you Madame Chair for the introduction of S. 1733, the Clean Energy Jobs and American Power Act, which will ensure that the Senate addresses an issue that many would rather ignore. Climate change is this generation's leading environmental threat. Doing nothing to address the threat will not only negatively and severely impact this generation, but generations to follow. As we continue to defer needed common-sense solutions, the inevitable task at hand simply continues to grow more difficult and expensive. Evidence continues to accumulate about the effects of a changing climate and we are more convinced than ever that enacting a comprehensive program with appropriate safeguards in place is a must.

I would ask to submit for the record a recent National Commission on Energy Policy (NCEP) report, *Climate Change and the Economy* that measures the economic impacts of a changing climate on key sectors and regions of the country (i.e. Montana forests, North Carolina coastlines, New Mexico water, etc.). This report is an attempt to provide information about the cost of inaction to help counter those who cite the cost of a cap-and-trade program as the basis of their opposition.

Your legislation represents an important and necessary step forward for addressing the issue and for hopefully convincing your colleagues that the time for action is now-- in this Congress!

Cap-and-Trade Approach
Although we have witnessed opposition to a cap-and-trade approach for a variety of reasons, cap-and-trade, while certainly not a perfect policy, represents the best option for achieving necessary reductions of greenhouse gases in a timely and a cost-effective manner. Most stakeholders on all sides of the debate generally agree that a program mandated by Congress is far preferable to the command and control approach that EPA would have to impose following the landmark 2007 Supreme Court ruling in Massachusetts v. EPA. And realistically, that is the alternative: Congress or EPA taking the lead role. Inaction by both would be unacceptable.

Cost Certainty
Since the cap-and-trade debate began, the ability to form a meaningful consensus has been hampered by disagreements over the projected costs of compliance. Taken together, even moderately different views on the cost of new technologies, the speed at which they will deploy, the availability of offset credits, and the macro-economic response to a price on greenhouse gas emissions can lead to dramatically different estimates. Such disparities point to the inherent difficulty of making predictions, particularly when it involves complex social, economic, and technological factors. As a result, the debate over compliance costs remains a formidable barrier to forging a legislative consensus.

I would like to commend the bill for trying to reconcile the need for environmental certainty with economic certainty. While some believe that the early year emissions reduction targets may be unreachable, a well functioning market with an appropriate price collar would ensure that the allowance price stays in an affordable and predictable price band. We believe that the ability to point to a reasonable price collar and strategic reserve of allowances is essential for reassuring your constituents that the cost of the program will be manageable. Let me restate my basic proposition: the cost of inaction would be the greatest to all.

I ask to submit for the record NCEP's recent policy paper, *Managing Economic Risk,* which provides more detail on how to structure such a reserve to ensure its success.

NCEP has also recently completed policy papers on *Domestic and International Offsets*, *Oversight of the Greenhouse Gas Trading Market* and the *Case for Action.* I also request that these be entered into the record.

In short, we believe that a climate bill must have elements of both price and emissions certainty. It is our view that simplifying and strengthening the cost containment provisions in this legislation is critical to building a bipartisan consensus for meaningful action this year. We commend you for increasing the size of the strategic reserve to about 3.5 billion tons from 3 billion tons in your earlier draft and from the 2.7 billion tons in Waxman-Markey bill. However, NCEP modeling shows that in the event that offsets projections are too optimistic and/or if low carbon technologies advance slower than predicted, a reserve closer to the 6 billion tons (authorized in the Lieberman-Warner-Boxer climate bill passed by the EPW Committee in 2008) would be necessary to ensure that $28 is the true ceiling price. This would more effectively address concerns raised by some opponents that the reserve approach is inferior to a true price collar.

Transportation Provisions in the Climate Bill

As one of four Co-Chairman of the National Transportation Policy Project (NTPP), I strongly applaud efforts undertaken in this bill that emphasize investment in the transportation sector and situate it as both central to the reduction of greenhouse gas emissions and to improvements in energy security. As you know, improving performance of our nation's transportation systems is necessary to meet the four urgent national priorities called for in S. 1733, including: putting America back in control of our energy future, reasserting American economic leadership and competiveness, protecting our families from pollution, and ensuring our national security. Incorporating *clean transportation* solutions into climate and energy legislation will bring massive benefits to our nation. Making the policy connections between these historically divergent issues more explicit will lead to efficient solutions that will maximize limited resources.

The 2009 National Transportation Policy Project report, *Performance Driven: A New Vision for U.S. Transportation Policy*, the executive summary of which I request be entered into the record, lays a framework for federal transportation policies that are performance driven, linked to a set of clearly articulated goals, and held accountable for results. Energy security and environmental protection together represent one of five national goals that our Project believes should be used to guide federal transportation policies and investment decisions. Awareness of the energy security and environmental protection dimensions of transportation is not new. However, in the past these concerns have largely been addressed outside transportation policy, often through separate policies regulating vehicle or fuel characteristics, but not as a factor informing our transportation planning and investment decisions. NTPP believes the federal government should play a key role in integrating climate change, energy security, and environmental protection with existing mechanisms for transportation planning and decision-making, rather than approach these issues separately.

I recognize that this committee has the unique ability to bring these areas together, and that scope extends beyond this climate legislation. This same integration needs to occur in the upcoming transportation authorization legislation. The federal transportation program, extended under a 31-day continuing resolution, is likely to be subjected to many more short-term extensions before full authorization is in place. This process of short-term extensions is detrimental not only to states attempting to maintain and invest in their existing transportation infrastructure, but is harmful to the national economy at a time when substantial reinvestment is needed. We understand the position of this committee and the Administration is to seek an 18-month extension of current law to allow for development of a new 21st century vision for federal transportation policy. Part of this vision should include the integration of climate and energy considerations into transportation investment decision-making. I am very pleased to see this committee putting forward climate legislation that sets the stage for this larger integration.

My testimony will cover several facets of the transportation provisions in the bill. First I want to highlight some of the elements of the bill that are directly in line with the recommendations in the NTPP report. I commend you for putting forth legislation that addresses five critical needs, each of which I will address in my testimony. The legislation:

1. *Allocates specific funding for necessary investment in transportation*
2. *Recognizes the benefit of integrating mutually beneficial policies across the sectors of transportation, energy and the environment*
3. *Frames a national vision addressing national objectives*
4. *Uses competitive programs that allow flexibility and incentivize innovation*
5. *Elevates the importance of data collection for improved transportation planning*

Next I will offer some NTPP suggestions for strengthening certain aspects of the legislation, consistent with the following principles:

1. *Transportation investments, even those made with climate revenues, can be optimized to achieve not only environmental and energy outcomes, but also economic, safety, and accessibility outcomes*
2. *Mode-neutral funding leads to greater system efficiency and innovation, and ensures that investments can advance over-arching national goals*
3. *Carbon pricing is necessary but not sufficient in and of itself for sending a key price signal to transportation system users*

Highlights of the Clean Energy Jobs and American Power Act

Funding Set Aside for Investment in Transportation

Setting aside funds from a cap-and-trade scheme for investment in the transportation sector, as this legislation does, is critical. A carbon pricing or cap-and-trade policy that devotes a portion of revenues toward advancing transport-sector technology solutions and providing incentives for climate-friendly transportation policies is a necessary step in the right direction. Given that transportation contributes approximately one-third of greenhouse gas emissions nationally, it follows that the sector should bear an appropriate burden and receive a commensurate portion of any carbon revenues.

Tying investments in more efficient transportation to climate revenues is important for two reasons. First, it allows for some portion of revenues from the transportation sector to be put back into transportation, thus enabling the sector to make smart investments that will eventually reduce its level of greenhouse gas emissions. Without these revenues, the systemic changes to our transportation network that will be essential for combating climate change will not be possible.

Second, it provides additional funding for an essential sector of the economy that has been strained to capacity. The federal surface transportation program needs to be more performance-driven no matter what its size – but the transportation infrastructure needs for a growing economy far exceed what is currently available in terms of funding. Climate revenues provide a sensible and stable source of funding for essential investments as long as those investments are made in accordance with clear national goals.

The revenues set aside for transportation in this legislation are an excellent beginning. But they are well below the portion of revenues that transportation should receive based on the contribution of that sector to the climate change problem. I know Senator Carper will be working to increase the funding set aside for transportation in this bill and we look forward to working with him to make that happen.

Integrating Mutually Beneficial Policies

Addressing both the environmental protection and energy security aspects of transportation simultaneously, and thus integrating what have historically been thought of and addressed as separate policies, is essential for the future of this nation. Existing environmental and energy-related policies that have a direct connection to transportation range from vehicle fuel economy standards to biofuels mandates to investments in new facilities. In the past such policies have not generally been integrated into a national transportation strategy. Importantly, this legislation attempts to rectify that oversight.

As stated previously, the transportation sector has significant climate liabilities directly related to petroleum fuel consumption and emissions. Oil use for transportation accounts for a large share—approximately one-third—of overall U.S. energy-related greenhouse gas emissions, largely because the transportation network is 97% dependent on oil[1]. In fact, the transportation sector's contribution to national emissions is second only to that from electricity production[2], and transportation consumes almost 70% of all oil used in the U.S[3]. *Within* the sector, surface transportation—that is, cars, trucks, buses, and rail—accounts for about 86 percent of carbon emissions.[4] It is therefore timely and critical that this legislation, as well as the next surface transportation authorization bill, comprehensively address the connections between the transportation, energy and environmental sectors.

Critics often assume that most transportation investments have adverse environmental outcomes. But recognizing that policies to improve the quality or efficiency of the transportation network often deliver energy and climate benefits is essential. For example, policies that promote smoother traffic flow can ease congestion while simultaneously reducing gasoline consumption and greenhouse gas emissions. Policies that result in freight shifts from truck to rail transport can lead to the more efficient movement of goods while also reducing diesel consumption, road wear, and emissions. In cases like these, where multiple problems can be tackled at the same time, the existence of co-benefits can substantially increase overall returns on the investments. This bill makes notable strides towards such an approach. Given the shortage of available public resources and the magnitude of environmental risk involved making these connections through legislation is essential.

Framing a Vision Addressing National Objectives

Framing a vision that addresses national-level concerns and establishes policies with national objectives related to environmental protection and energy security is critical. Efforts to address environmental concerns of transportation infrastructure in particular have in the past been limited to considering the direct local impacts of a particular project. Additional efforts are made to mitigate these impacts once they are identified, but national or global-level environmental issues such as climate change have not typically been taken into account in any systematic way.[5]

For example, the environmental impact statement (EIS) required during the planning and construction phase of a new transportation project is designed to identify the environmental effects of a project as well as possible alternatives. If the project is forecast to increase traffic, then the particulate pollution from that increase is calculated. If the roadway will create more noise in surrounding communities, then a sound wall is constructed to mitigate the problem. These project-level responses are not necessarily deficient in terms of addressing local impacts, but they are inadequate for the broader challenges facing our nation. The EIS occurs at the project level, while energy and climate impacts are most clearly seen through a larger aperture, at a systemic level.

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[1] Department of Energy, Energy Information Administration, "Annual Energy Review 2004" (doe/eia-0384), pages 42 and 154.

[2] U.S. Environmental Protection Agency. "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007." April 2009. http://www.epa.gov/climatechange/emissions/usinventoryreport.html

[3] Department of Transportation, Bureau of Transportation Statistics, Transportation Statistics Annual Report 2004, Chapter 2 Section 15

[4] U.S. Environmental Protection Agency. "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007." April 2009.

[5] 1) World Business Council for Sustainable Development. "Mobility 2030: Meeting the Challenges to Sustainability." July 2004. 2) Transportation Research Board. "Toward a Sustainable Future – Addressing the Long Term Effects of Motor Vehicle Transportation on Climate and Ecology, Special Report 251." 1997. 3) Sperling, Dan and Deborah Gordon. "Two Billion Cars – Driving Toward Sustainability." 2009.

By devoting a portion of transportation grants to investments that will reduce greenhouse gas emissions, this legislation establishes an over-arching and specific national objective for transportation investments with climate revenues. These types of grants are useful because of the flexibility built in for local entities as to how they want to accomplish national objectives. This type of bottom-up approach also helps to provide incentives for collaboration across various transportation agencies. In order to achieve real greenhouse gas reductions and effectively compete for federal grants, regional agencies will need to collaborate in a systemic and programmatic way.

This concept of a national vision and goals but local strategies and planning requires a fundamental shift in the way we think about transportation investments. We usually think about new investments as specific "projects" such as a new transit line. But to actually achieve emissions reductions and other national goals such as economic growth and safety, we need to shift from a project orientation to a programmatic one. This means thinking about how that new transit line can be integrated into an overarching program or plan that considers land use decisions, pricing options, access to the transit line, and any other policy that can improve performance. This programmatic view is evident in the CLEAN-TEA provisions of this legislation, and that means these grants are more likely to be effective in achieving the national goal of reducing emissions.

Using Competitive Programs to Incentivize Innovation

Competitive grant programs are essential for encouraging innovation, as well as flexibility at the state and local level. The transportation greenhouse gas emission reduction program grants contained in this Act specify outcomes, rather than methods, thus encouraging potential recipients to develop new and more effective ways of meeting program goals. They can also help to move beyond a myopic focus on specific infrastructure projects, and towards a programmatic emphasis that allows for other elements such as land use, pricing, and vehicle fuels to be integrated into transportation plans.

NTPP recommends two competitive programs for federal surface transportation policy. One program would be focused on national connectivity and freight, while the other would focus on metropolitan accessibility improvements. In both cases, grant proposals would be evaluated based on their projected improvements among specific performance metrics that are directly related to national goals. The goal of these programs is to incentivize innovation among both states and metropolitan regions in how they propose to tackle national transportation goals.

The CLEAN-TEA competitive program embedded in this legislation is designed in a way that can foster innovation. It is structured such that funding is distributed to grant recipients based on evidence and analysis regarding how well the grantees can meet specific national goals. The evidence and performance-based structure is essential not only for innovation, but for actually reducing emissions. Keeping such a program truly competitive and evidence-based is critical for its success. One way to do this is to ensure a joint process between Congress and the Executive Branch. Without such a process, any competitive program runs the risk of allowing funds to be distributed without regard for performance. For example, the New Starts program – though not without flaws – effectively distributes funds for new transit projects by using both objective analysis and Congressional oversight. The competitive programs in this Act can and should be structured in a similar manner.

Elevates the Importance of Data Collection for Improved Transportation Planning

Goals that are performance driven, such as in this legislation, rely on quantitative metrics to evaluate performance and to enforce accountability. In order to move toward a performance-based system reliable "real-time" data must be available. Generally, real-time, actionable data does not exist. There must therefore be data improvements, including improvements in the amount of information collected, processed, analyzed and distributed on such things as environmental impact, emissions, and energy consumption of proposed transportation projects.

Collection of data on transportation-related greenhouse gas emissions is not only necessary for integrating climate considerations into transportation planning, but also for determining where available resources might be more effectively invested. If we lack adequate data on transportation-related emissions it will be extremely challenging to make policy changes to address those emissions. It will be even harder to reward innovation and competition that results in emissions reductions. Data collection and planning improvements are therefore essential steps towards real emissions reduction, and are thankfully are not overlooked in this legislation. This bill thoughtfully calls for collaboration among federal agencies in updating and regulating the collection of data on transportation-related energy efficiency and greenhouse gas emissions. The legislation stipulates that federal agencies work toward defining and collecting similar performance data from freight. Also, important is the fact the bill calls for data to be shared among states and government agencies.

Improved data collection efforts can lead to more effective planning, as is recognized in this bill. With a few exceptions, the transportation planning processes that currently exist at the state and metropolitan levels do not support a strategic, performance-based, and accountable approach to decision-making. These planning processes must be reformed. The reach of metropolitan planning agencies should be extended to incorporate relevant economic geographies, and the responsibilities of planning agencies should be broadened to ensure that (a) transportation planning is conducted collaboratively across jurisdictional lines, (b) planning for the preservation of existing systems is coordinated with system expansion and improvement, and (c) planning decisions are linked to the achievement of national goals. Similarly, the planning that occurs in state transportation agencies must reach across jurisdictional lines so that strategic, performance-based plans and programs can be developed to serve multi-state corridors and/or multi-state metropolitan regions.

It is a step in the right direction that this bill calls for collaboration across federal agencies to establish regulations, updated from time to time, that improve the ability of transportation planning models and tools, including travel demand models, to address greenhouse gas emissions. Also, critical is the fact that the legislation calls for transportation planning requirements to be updated in order to meet the goals of reduced greenhouse gas emissions. However, the focus of government at all levels should be on adequate planning processes, rather than on particular planning structures. No single structure fits all multi-state or metropolitan regions in any case. Adequate planning processes support and promote strategic planning across modes, agencies and jurisdictions, and link transportation planning and investment decisions to other key policy concerns such as land use, housing, energy, and environmental impacts.

Incentives can improve planning, including offering the carrot of additional planning funds in exchange for collaboration across modal, agency, and jurisdictional lines. This will help shift the focus to encouraging adequate planning processes, rather than mandating specific institutional structures. To the extent that current federal financial support for transportation planning is not sufficient or flexible enough to support broader planning efforts by state agencies or MPOs, it should be expanded. Public sector roles and responsibilities must be reshaped and reorganized for effectively planning, funding, building, operating, and regulating the nation's transportation system. The foundations of these necessary collaborations across government agencies are called for in this legislation.

NTPP Recommendations for Strengthening S. 1733

Investments in Transportation Must Be Held Accountable for More than Reducing Greenhouse Gas Emissions

Setting overarching national goals affords states and localities the flexibility to meet the goals in a way that is most suitable for them. As has been discussed, this is one of the strongest features of the proposed competitive grant programs outlined in this legislation. However, we must remember that although we want to reduce emissions with these investments, at the end of the day they are investments in transportation. Transportation does more than simply create emissions – it also has substantial economic and safety impacts that should not be ignored. All transportation investments must be held accountable for achieving progress toward a *suite* of overarching national goals, including economic growth and safety. Federal transportation funding should not be awarded for demonstrating reduction in greenhouse gas emissions alone; investments must also demonstrate progress toward mutually beneficial goals.

Energy security and environmental protection constitute one of five specific goals that NTPP recommends national transportation policy should be framed. These goals are grouped together because both objectives can often be advanced using the same strategy (particularly to the extent that climate change is considered to be the primary unaddressed environmental concern). The NTPP report identifies a host of performance metrics by which transportation investments can be evaluated. The twin goal of energy security and environmental protection, for instance, has two associated metrics—one focused on petroleum consumption, the other on CO_2 emissions. Using both of these addresses the concern that some strategies to improve energy security alone could have adverse climate impacts (i.e. leading to *increased* CO_2 emissions).

Four additional goals outlined by the NTPP framework include: economic growth, national connectivity, metropolitan accessibility, and safety. There are eight performance metrics associated with these goals, which together form a methodology for measuring progress towards national transportation objectives. Since the report recommends distributing funding to programs that advance all of these goals, consideration of energy and climate becomes integral to all transportation investment decisions. The framework is deliberately not specific about how these goals should be achieved; flexibility is built in for states to determine.

We are pleased to see this legislation following a similar strategy. However, criteria for any grant program should include more than just emissions reduction potential. In particular, we recommend including metrics for economic growth, such as improvements in accessibility to jobs, labor, and other activities. We also would suggest a measure that evaluates the utility of the national transportation network, and how that is being improved, as well as looking at whether investments reduce congestion in specific transportation corridors. For safety, we recommend evaluating whether an investment will reduce fatalities and injuries, both on a per capita basis and per vehicle miles travelled. Reductions in emissions and fuel consumption should be emphasized because this is a climate bill, but that does not mean we can afford to ignore the economic and safety implications of transportation investments. These additional performance metrics must also be included.

Mode-Neutral Funding Leads to Greater System Efficiency and Innovation

Transportation programs and policies have long been characterized by modal "stove-pipes" and distinct interests. Despite efforts in recent bills to reconcile these varying interests and introduce "flexibility" in the use of various funding streams, many transportation policy discussions continue to be dominated by endless debates about what is more subsidized or disadvantaged:

highways versus transit, trucks versus rail, and passengers versus freight. The fact that it remains difficult if not impossible to plan for and optimize across different modes constitutes a major barrier to maximizing returns from transportation investments. Dramatic restructuring is needed to surmount this barrier so that decision makers can focus on finding the most cost-effective solutions to identified problems at the metropolitan, state, and corridor levels.

The current decision-making process is compartmentalized by transportation mode —often with separate rules, procedures, and eligibility requirements for each mode—and is not driven by economic analysis. By their very nature these disconnected funding streams discourage comprehensive strategies to address transportation problems in a way that would most improve the performance of the overall system. While some may be convinced of the relative promise of particular transport options or strategies, no particular mode represents the best solution to all problems in all situations. A holistic approach to transportation investments is of particular importance in the context of severe resource constraints, which limit the ability to fund all competing demands. This suggests that public investments, whether federal, state, or local, should be programmatic in scope rather than project—or mode—specific. In sum, mode-neutral programs, which are designed to prioritize projects on the basis of cost-effectiveness and to enhance connections across different modes, hold the most promise for improving system performance for all users.

Given this approach, funds should flow directly to states on a mode-neutral basis for the purpose of preserving and enhancing elements of existing transportation systems—including roads, freight and passenger rail—that play a rôle in connecting the nation. This will require a methodical redefinition of what comprises the federal system, to ensure that included facilities are truly in the national interest. A mode-neutral approach optimizes performance across the entire system. No particular mode represents the best solution to all problems and situations, and having a set aside of funds for a specific modes is detrimental because the optimum solution in certain places to demonstrate optimum performance towards reducing pollution, increasing jobs, and ensuring our national security might be through investment in a non-transit based mode.

Section 215 of this legislation allocates funding specifically for investments in public transportation. Although public transit has tremendous potential to reduce overall emissions in many cases, we would still recommend using a mode-neutral approach. Mandating investment in transit forces states and metropolitan regions to invest precious transportation resources in that specific mode, even if they might otherwise make different transportation investments that could actually do a better job of reducing emissions. In fact, it is possible to make poor investments in public transit that actually increase overall emissions. A better approach is to leave the modal choice to grant recipients, and instead focus the federal effort on making sure that these investments will actually provide the greatest emission reductions for the lowest possible cost.

Carbon Pricing is Necessary but Not Sufficient for Sending a Key Price Signal to Transportation System Users

At a national level, one of the most important measures available for integrating environment, energy and transportation objectives is proper pricing. With more accurate price signals to reflect the true cost of transportation people will make more informed decisions about their transportation choices, altering everything from home and vehicle purchases to commuting habits. More accurate price policies should include not only the environmental, but also construction and maintenance, and congestion costs of travel. The Eddington Report, a comprehensive study of national transportation policy in the U.K. notes that the transport sector needs to "play an important role in an economy-wide response" to the climate change challenge. It goes on to argue that transportation "should meet its full environmental costs," and that "getting the environmental prices right across all modes makes strong economic as well as environmental sense."[6]

Cap-and-trade programs represent important policy considerations for the transportation sector. However, carbon pricing is unlikely to cause a large shift in transportation technology, travel demand, or infrastructure investment. EPA estimates that House-passed legislation incorporating a cap-and-trade system to limit greenhouse gas emissions is likely to have an impact on gasoline prices amounting to less than 35 cents per gallon by 2030.[7] As NCEP has noted, this level of price signal alone "would be expected to produce very little improvement in the fuel efficiency of passenger cars and very little reduction in vehicle-miles traveled."[8] Accounting for the additional costs of congestion, construction, and maintenance would result in a stronger price signal and commensurately larger impacts, but the overall effect might still be small relative to the kinds of price swings that the market itself—independent of any targeted policy intervention—has produced in recent years.

In other words, carbon pricing is helpful but it is not enough of a price signal to really make a difference in the climate liabilities of the transportation sector. More accurate pricing of the social, economic, and environmental externalities of travel is required. This would lead to more sustainable development patterns, as well as heighten individual awareness and concern for energy consumption, emissions, and congestion impacts. The NTPP report outlines options for raising transportation revenue from a system of user fees, ensuring that transportation users bear more of the cost of their energy and environmental impacts. This approach offers a range of benefits, not the least of which is an increased awareness of limited resources.

There is a need for increased research and planning in this area to help our nation transition to a user-pay funding mechanism. The goal should be to establish and then implement an achievable plan that can generate the support of the American public, and then transition our national transportation system to a user-based revenue system at the earliest possible date. With respect to climate change, we must ensure that transportation users cover the full costs of their carbon emissions, and that an appropriate share of revenues from a carbon pricing scheme go toward supporting transportation infrastructure investments and operational reforms that promote further carbon reduction.

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[6] United Kingdom Department for Transport. "The Eddington Transport Study: The Case for Action." 2006. pp. 5-6.

[7] Environmental Protection Agency. Analysis of Waxman-Markey draft legislation.

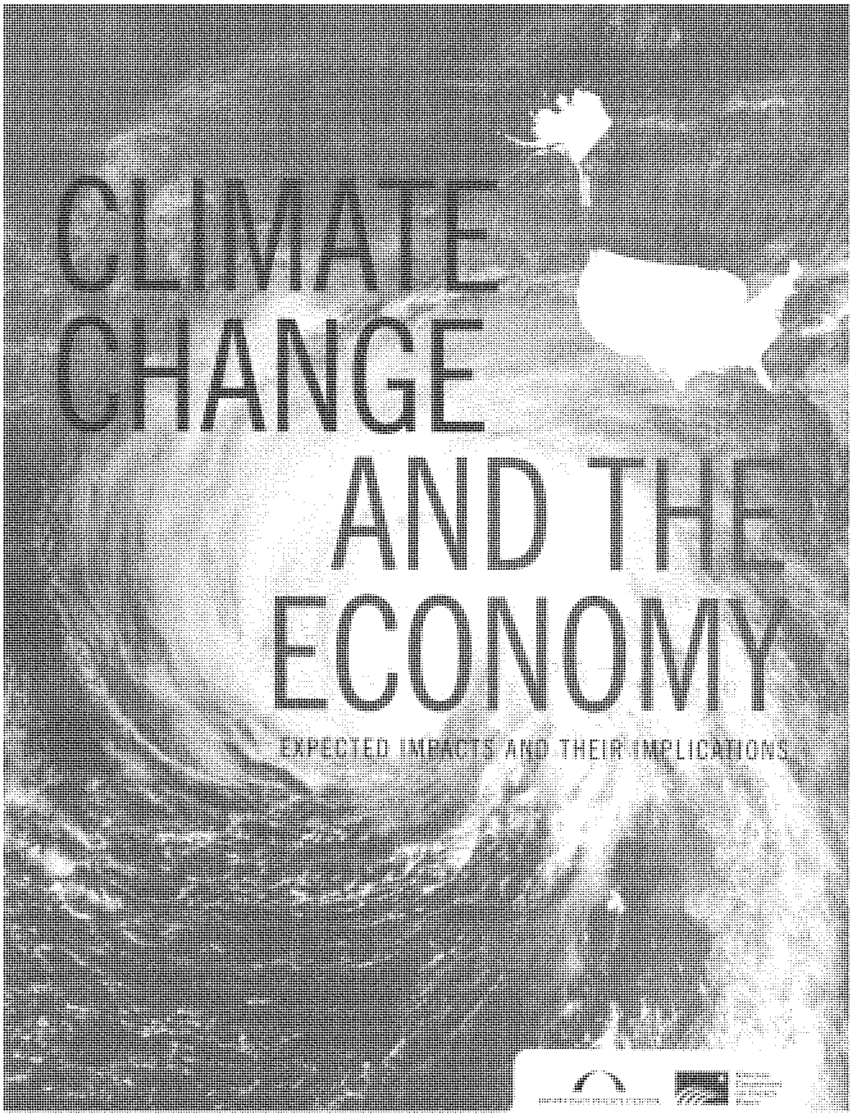
[8] National Commission on Energy Policy. "Ending the Energy Stalemate, A Bipartisan Strategy to Meet America's Energy Challenges." Dec. 2004.

Conclusion
Our nation faces imposing challenges to our economic, environmental, and energy futures. Rethinking transportation systems and investments cannot solve all of these problems – but none of these problems can be fully addressed without dealing with transportation. In that spirit, this legislation must be commended for recognizing that connection. As a Co-Chair of the National Transportation Policy Project I believe that our report provides a framework and recommendations that could help to strengthen the transportation provisions in this legislation.

We hope that you will keep in mind the following, as you continue to develop this legislation:

1. *Transportation investments, even those made with climate revenues, can be optimized to achieve not only environmental and energy outcomes, but also economic, safety, and accessibility outcomes*
2. *Mode-neutral funding leads to greater system efficiency and innovation, and ensures that investments can advance over-arching national goals*
3. *Carbon pricing is necessary but not sufficient for sending a key price signal to transportation system users*

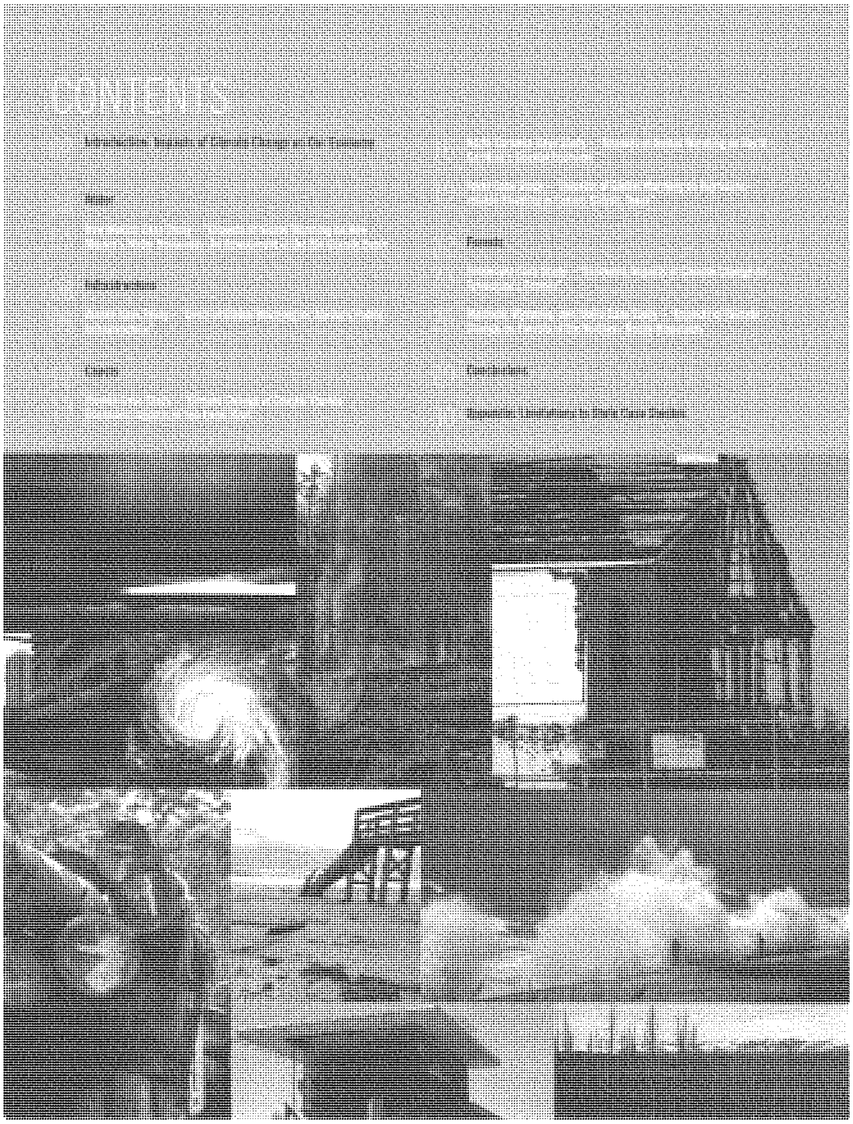
The Bipartisan Policy Center welcomes further opportunities to work with and support the Senate Committee on Environment and Public Works. We ask you to draw upon the work of the National Commission on Energy Policy and the National Transportation Policy Project as the Committee seeks to further define and clarify transportation's role in climate change and reducing greenhouse gas emissions.



CLIMATE CHANGE AND THE ECONOMY

EXPECTED IMPACTS AND THEIR IMPLICATIONS

ACKNOWLEDGEMENTS



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IMPACTS OF CLIMATE CHANGE
ON OUR ECONOMY

Climate change and its impacts are becoming apparent now throughout the United States and are projected to increase in the future. A variety of studies examining projected economic impacts of climate change in various U.S. locations yield a number of overarching lessons.

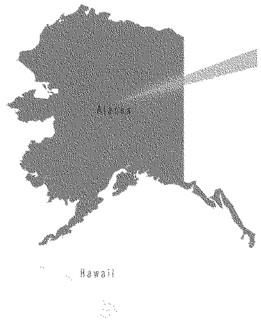
- Climate change will have wide-ranging impacts on key resources that affect Americans.
- The economic costs of these impacts will be significant; and the greater the warming, the larger the costs.
- The worst impacts can be avoided through proactive actions including reducing heat-trapping emissions and planning for those changes that are unavoidable.

As our nation strives to develop effective policies to respond to climate change, it is essential to consider the economic costs of both action and inaction. Much of the current conversation in the policy arena revolves around the potential economic costs of actions to reduce heat-trapping emissions. Relatively little attention is being paid to the much larger economic costs of unmitigated climate change.

A series of climate change impact studies was undertaken by researchers at universities around the nation to evaluate some of the economic costs related to particular climate-sensitive resources, from water in New Mexico, to infrastructure in Alaska, to forests in Idaho and Montana, to coastlines in Florida, Texas, and North Carolina. The findings of these analyses illustrate and underscore the enormous risks posed by unmitigated climate change, and the increasing urgency of policy actions to reduce these risks.

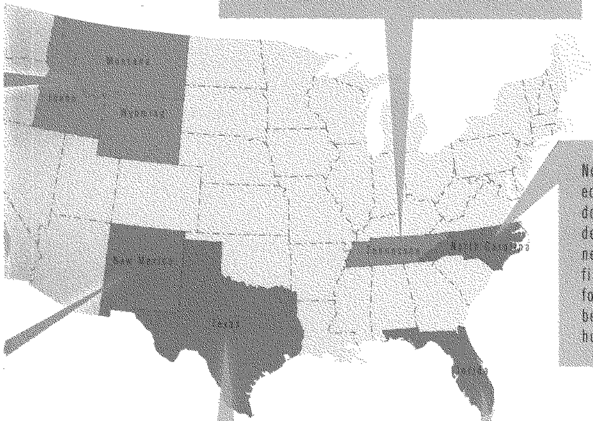
Impacts are projected to be significant around the nation, though with strong regional variations. For example:

- Drought and water supply challenges are expected in a number of regions, notably the Southwest, which is also the fastest growing region of the country.
- Along the Atlantic Coast, sea-level rise, hurricanes, and associated storm surge are among the greatest expected challenges.
- In Alaska, where warming is proceeding especially rapidly, damage to infrastructure is a major concern as coastlines erode and permafrost thaws.
- In mountainous regions of the U.S. West, insect infestations and forest fires threaten a growing population as well as ecosystems on which society depends.



In the forests of Montana, Wyoming and Idaho, warming is projected to produce longer periods of drought stress each summer. Drought stressed trees, increasing insect infestations, and more frequent and severe wildfires threaten people, homes, and ecosystems in the northern Rocky Mountains.

New Mexico's economy is threatened by water scarcity as snowpack and stream flows shrink and more water is lost to evaporation as temperatures rise. There will be greater competition for water supplies to serve agriculture, energy, and urban uses for a growing population.



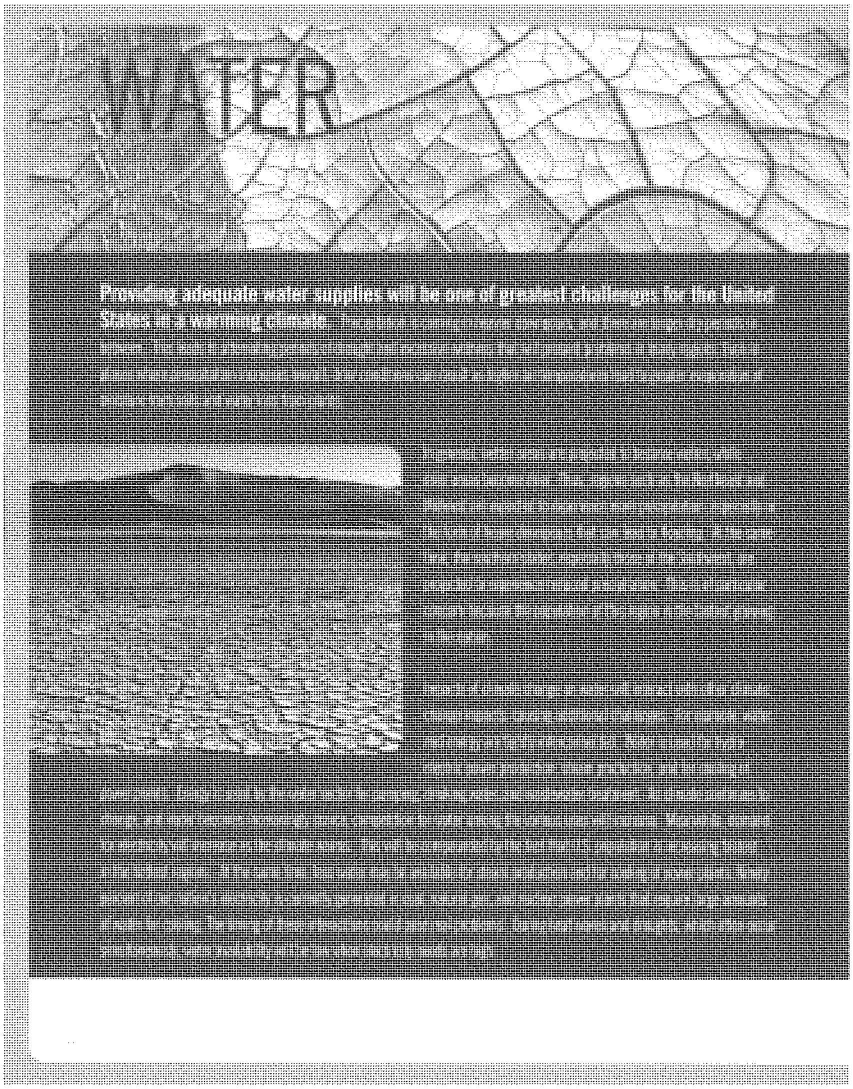
Alaska faces rising costs to maintain its public infrastructure as thawing ground undermines foundations of buildings and roads, retreating sea ice leaves coastlines exposed to erosion, and increasing heavy downpours raise the risk of flooding.

Tennessee's forests and the economic activity they support are projected to suffer with rising temperatures. Economically valuable oaks will be displaced by less valuable tree species. Trout fishing and other recreational pursuits will be negatively affected as temperatures rise.

North Carolina's coastal economy will suffer billions of dollars in losses as a result of declining property values, business interruptions, commercial fishing losses, damage to forests, and lost recreational benefits as sea level rises and hurricane intensity increases.

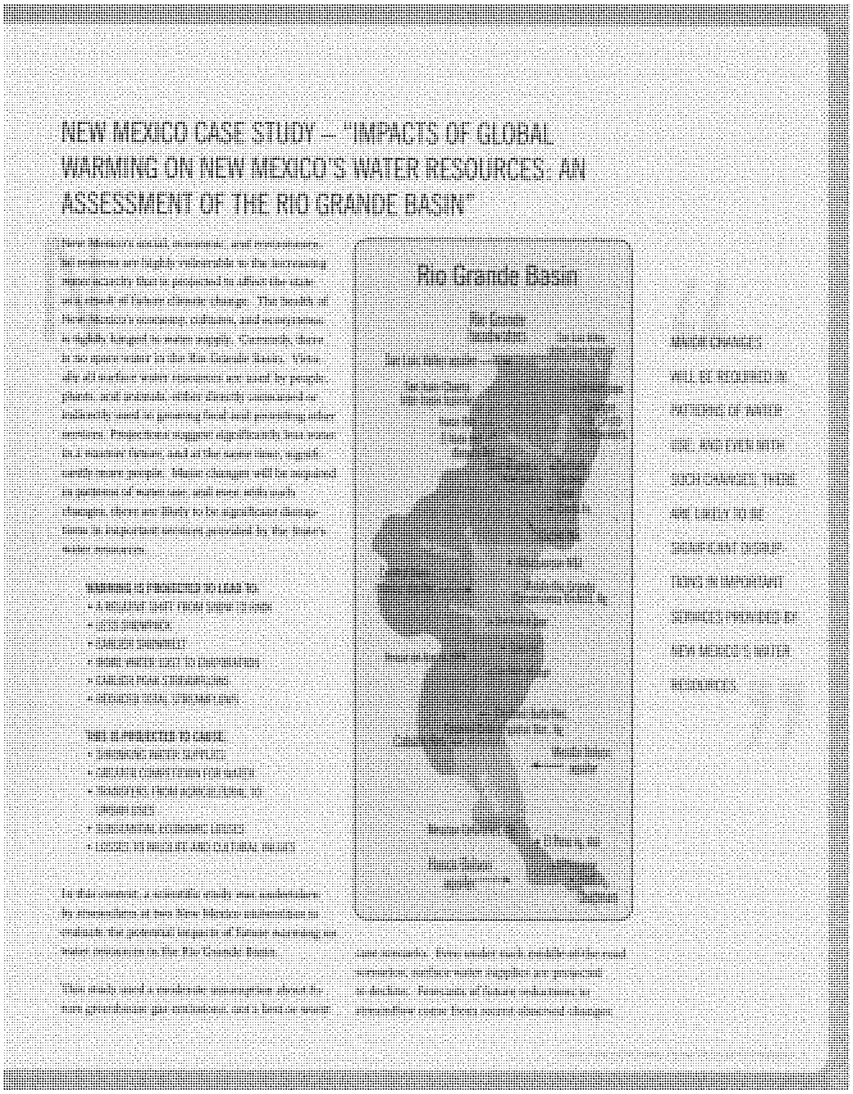
The Texas Gulf Coast faces increased risk of coastal flooding as sea level rises and hurricane intensity increases. Results include property damage, displacement of families and businesses, and economic impacts (such as from damage to oil refineries) that could be national in scope.

Florida's coastline can expect a dramatic increase in major storm surge events and associated property damage as sea level rises. And the amount of property at risk to permanent inundation is projected to increase in direct correlation with rising sea levels.



WATER

Providing adequate water supplies will be one of greatest challenges for the United States in a warming climate.



NEW MEXICO CASE STUDY – "IMPACTS OF GLOBAL WARMING ON NEW MEXICO'S WATER RESOURCES: AN ASSESSMENT OF THE RIO GRANDE BASIN"

New Mexico's social, economic, and environmental systems are highly vulnerable to the increasing water scarcity that is projected to affect the state as a result of future climate change. The health of New Mexico's economy, cultures, and ecosystems is tightly linked to water supply. Currently, there is no spare water in the Rio Grande Basin. Virtually all surface water resources are used by people, plants, and animals, either directly consumed or indirectly used in growing food and providing other services. Projections suggest significantly less water in a warmer future, and at the same time, significantly more people. Major changes will be required in patterns of water use, and even with such changes, there are likely to be significant disruptions in important services provided by the State's water resources.

WARMING IS PROJECTED TO LEAD TO:
- A RELATIVE SHIFT FROM SNOW TO RAIN
- LESS SNOWPACK
- EARLIER SNOWMELT
- MORE WATER LOST TO EVAPORATION
- EARLIER PEAK STREAMFLOWS
- REDUCED TOTAL STREAMFLOWS

THIS IS PROJECTED TO CAUSE:
- DIMINISHING WATER SUPPLIES
- GREATER COMPETITION FOR WATER
- TRANSFERS FROM AGRICULTURAL TO URBAN USES
- SUBSTANTIAL ECONOMIC LOSSES
- LOSSES TO WILDLIFE AND CULTURAL VALUES

In this context, a scientific study was undertaken by researchers at two New Mexico universities to evaluate the potential impacts of future warming on water resources in the Rio Grande Basin.

This study used a moderate assumption about future greenhouse gas emissions and a host of scenar-case scenarios. Even under such middle-of-the-road scenarios, surface water supplies are projected to decline. Forecasts of future reductions in streamflow come from recent observed changes

Rio Grande Basin

MAJOR CHANGES WILL BE REQUIRED IN PATTERNS OF WATER USE, AND EVEN WITH SUCH CHANGES, THERE ARE LIKELY TO BE SIGNIFICANT DISRUPTIONS IN IMPORTANT SERVICES PROVIDED BY NEW MEXICO'S WATER RESOURCES.

> “SHRINKING SURFACE WATER SUPPLIES AND RISING POPULATIONS WILL INCREASE COMPETITION FOR WATER AND RAISE THE ECONOMIC PRESSURE TO TRANSFER WATER FROM AGRICULTURAL TO URBAN AND INDUSTRIAL USERS.”

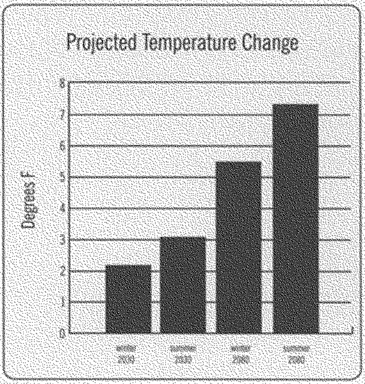
and projections from climate and hydrological models using monthly averages. Furthermore, reconstructions of past streamflows from tree-ring data show that even drier conditions have existed in this region in the past. As the continued build-up of greenhouse gases in the atmosphere increasingly warms the Earth's climate, water supplies in New Mexico's Rio Grande basin could become all the more scarce in the coming decades.

Key Findings

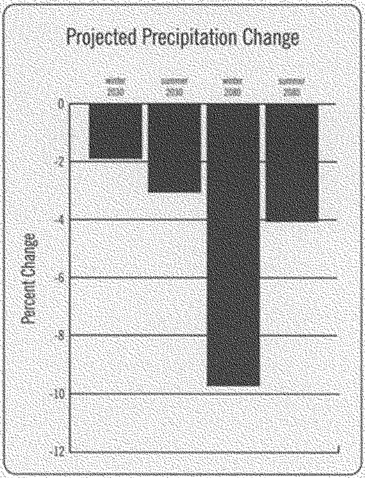
1. Warming is projected to result in less snowpack, earlier snowmelt, and more water lost to evaporation. Peak flow and total streamflow are projected to decline while peak runoff occurs a month earlier. Such changes in runoff would affect water storage systems and patterns of water availability, which in turn could seriously disrupt current human water use patterns, vegetation, and wildlife habitat.

2. Shrinking surface water supplies and rising populations will increase competition for water and raise the economic pressure to transfer water from agricultural to urban and industrial users.

3. Some water uses could be curtailed as surface water supplies are significantly diminished. The drier scenarios considered in this analysis lead to declines in surface water availability and use of about 12% by 2030, and 33% by 2080. Even the wettest scenarios project water use declines of 5% by 2030 and 8% by 2080 due to higher evaporation losses.

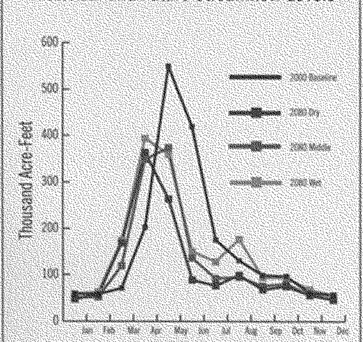


Projected Temperature Change

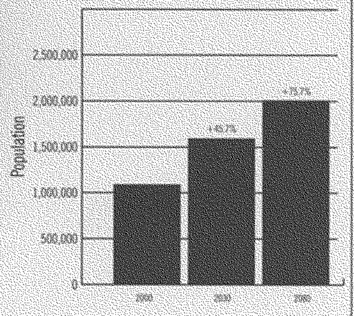


Projected Precipitation Change

Historical and Future Streamflow Levels



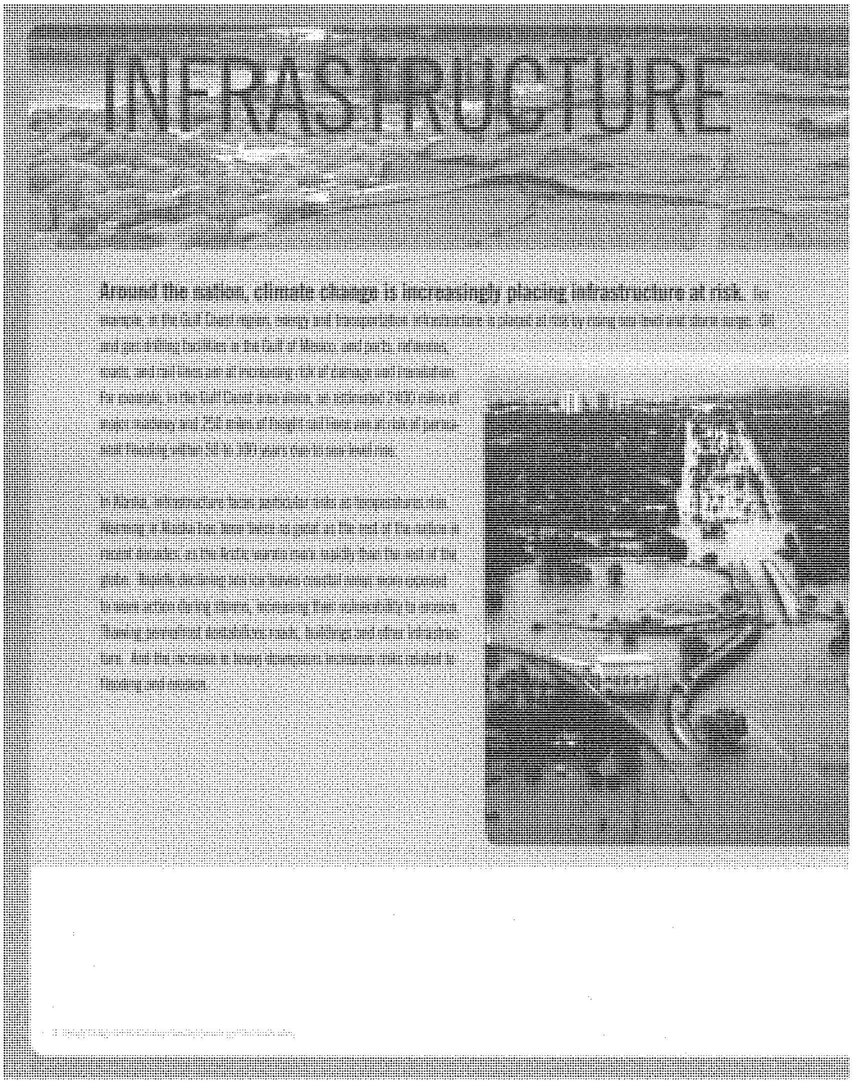
Projected Population Growth in Rio Grande Watershed Counties



4. Substantial and transformational disruption to New Mexico's agricultural and rural economy is projected in a warmer and drier future. Under optimistic economic and institutional assumptions, direct and indirect economic losses are projected by 2030 to range from about $13 million under a relatively mild climate scenario to $115 million under the driest scenario, with losses that rise by 2080 to range from $21 million to more than $300 million.

5. Agriculture's real value – and potentially the real loss to New Mexico's residents, tourists, and wildlife – goes far beyond this market value to the services that agriculture provides to the environment and quality of life. Losses and transfers amounting to over 30% of current water use levels will dramatically and negatively affect communities and environments across the region.

> “SUBSTANTIAL AND TRANSFORMATIONAL DISRUPTION TO NEW MEXICO'S AGRICULTURAL AND RURAL ECONOMY IS PROJECTED IN A WARMER AND DRIER FUTURE.”



INFRASTRUCTURE

Around the nation, climate change is increasingly placing infrastructure at risk. For example, in the Gulf Coast region, energy and transportation infrastructure is placed at risk by rising sea level and storm surge. Oil and gas drilling facilities in the Gulf of Mexico, and ports, refineries, roads, and rail lines are at increasing risk of damage and inundation. For example, in the Gulf Coast area alone, an estimated 2400 miles of major roadway and 250 miles of freight rail lines are at risk of permanent flooding within 50 to 100 years due to sea-level rise.

In Alaska, infrastructure faces particular risks as temperatures rise. Warming in Alaska has been twice as great as the rest of the nation in recent decades as the Arctic warms more rapidly than the rest of the globe. Rapidly declining sea ice leaves coastal areas more exposed to wave action during storms, increasing their vulnerability to erosion. Thawing permafrost destabilizes roads, buildings and other infrastructure. And the increase in heavy downpours increases risks related to flooding and erosion.

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ALASKA CASE STUDY – "COSTS OF GLOBAL WARMING FOR ALASKA'S PUBLIC INFRASTRUCTURE"

[illegible]

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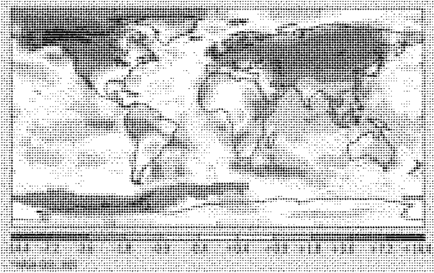
Observed Temperature Change (°F)

Winter (Dec., Jan., Feb.) : 1949-2003



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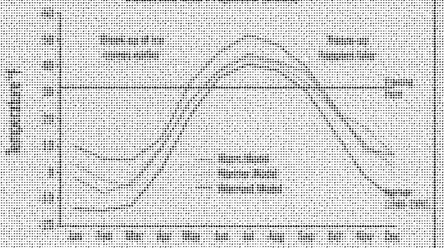
Monthly Average Temperature in Barrow, AK

Observed and Projected (2080)



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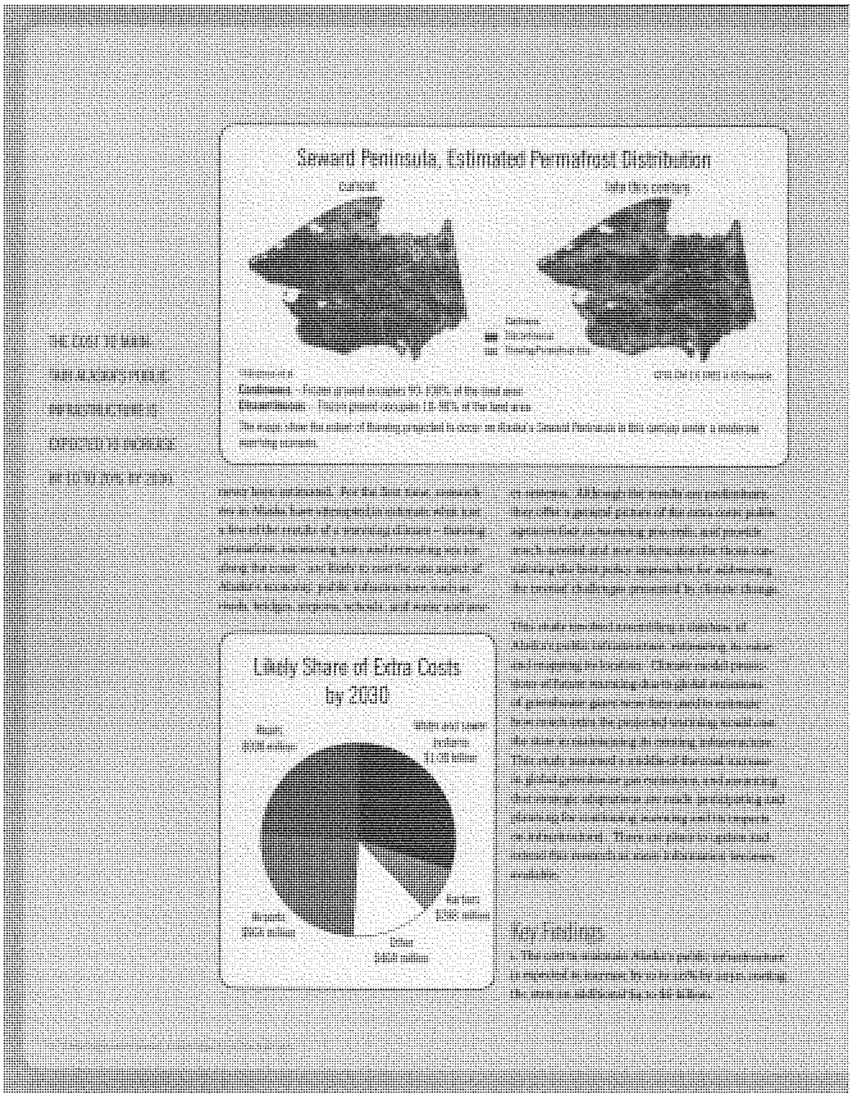

Seward Peninsula, Estimated Permafrost Distribution

Likely Share of Extra Costs by 2030

Key Findings

Estimated Protection and Relocation Costs for Three Alaskan Communities

Community	Costs of Future Erosion Protection	Costs to Relocate
Kivalina	$15 million	$95-125 million
Newtok	$90 million	$80-130 million
Shishmaref	$16 million	$100-200 million

[illegible]

AS SEA LEVEL RISES, COASTAL PERMAFROST THAWS, AND SEA ICE THAT ONCE PROTECTED THE COAST RETREATS, COASTAL AREAS FACE MORE EROSION FROM STORMS AND THE HIGHER WAVES THEY PRODUCE.

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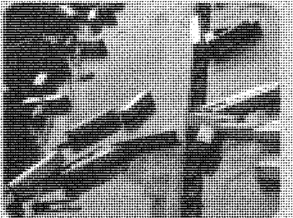
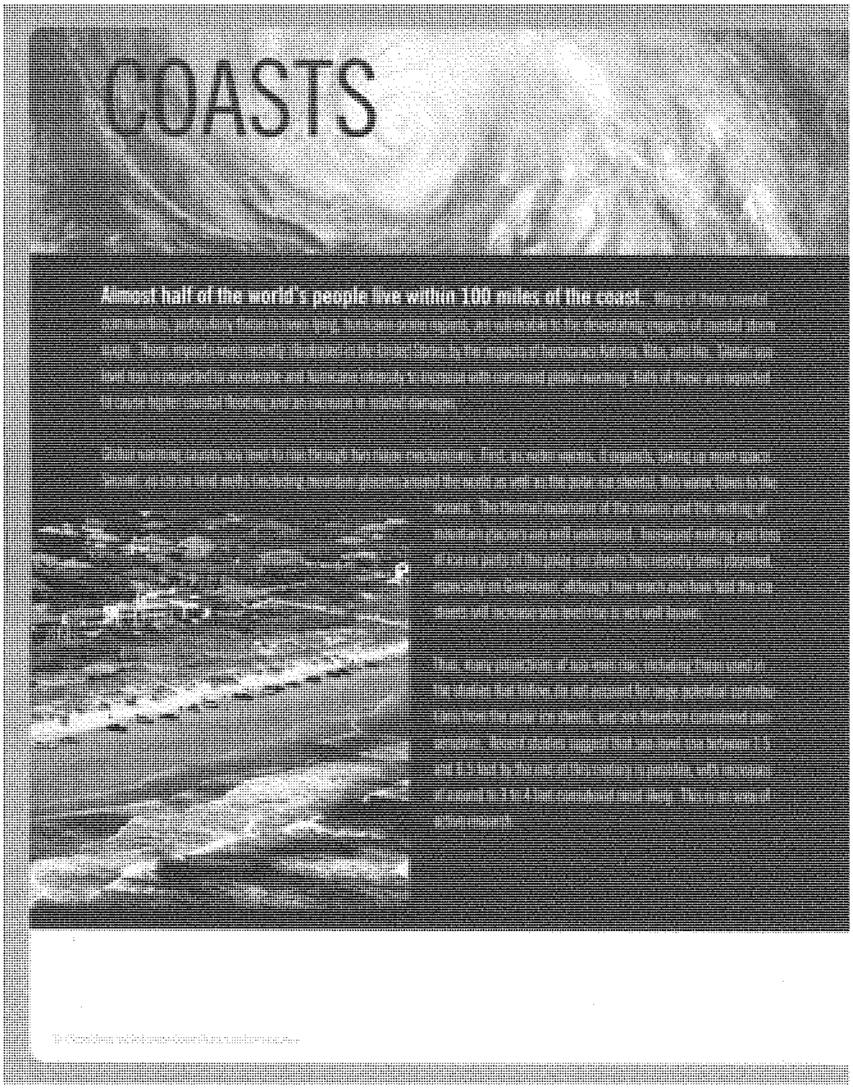
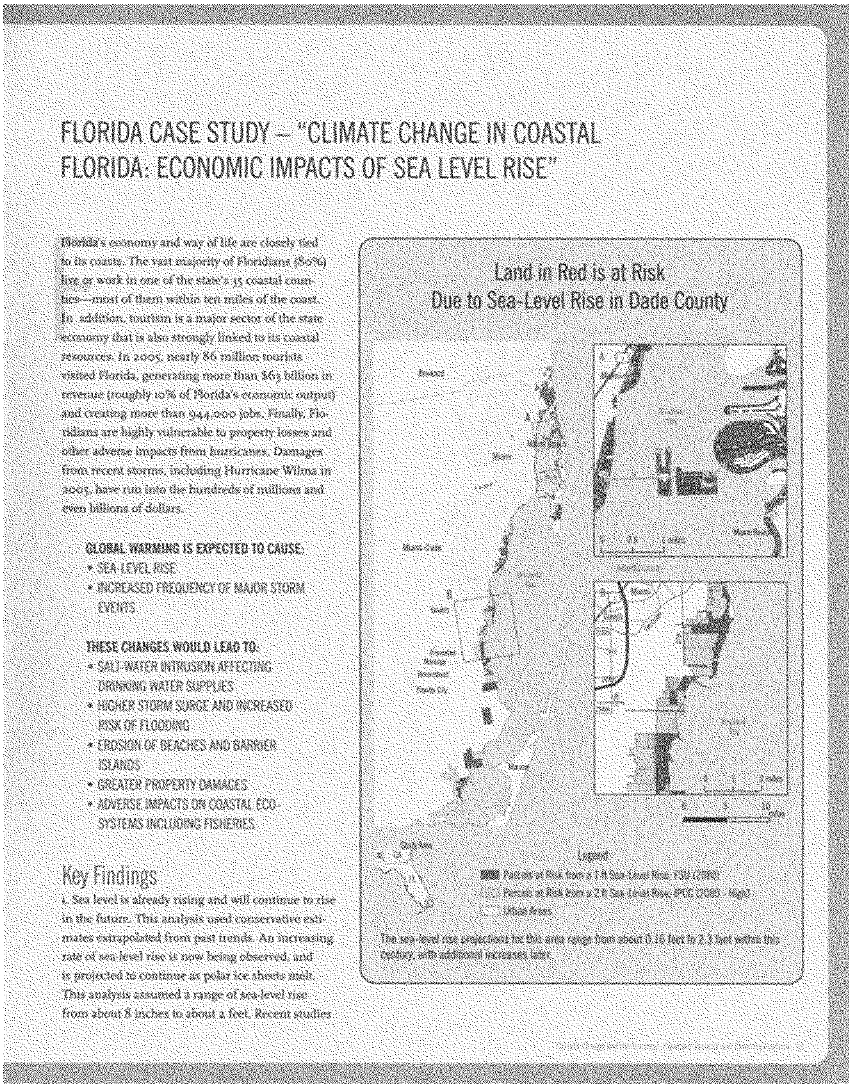




COASTS

Almost half of the world's people live within 100 miles of the coast. [illegible]



FLORIDA CASE STUDY – "CLIMATE CHANGE IN COASTAL FLORIDA: ECONOMIC IMPACTS OF SEA LEVEL RISE"

Florida's economy and way of life are closely tied to its coasts. The vast majority of Floridians (80%) live or work in one of the state's 35 coastal counties—most of them within ten miles of the coast. In addition, tourism is a major sector of the state economy that is also strongly linked to its coastal resources. In 2005, nearly 86 million tourists visited Florida, generating more than $63 billion in revenue (roughly 10% of Florida's economic output) and creating more than 944,000 jobs. Finally, Floridians are highly vulnerable to property losses and other adverse impacts from hurricanes. Damages from recent storms, including Hurricane Wilma in 2005, have run into the hundreds of millions and even billions of dollars.

GLOBAL WARMING IS EXPECTED TO CAUSE:

- SEA-LEVEL RISE
- INCREASED FREQUENCY OF MAJOR STORM EVENTS

THESE CHANGES WOULD LEAD TO:

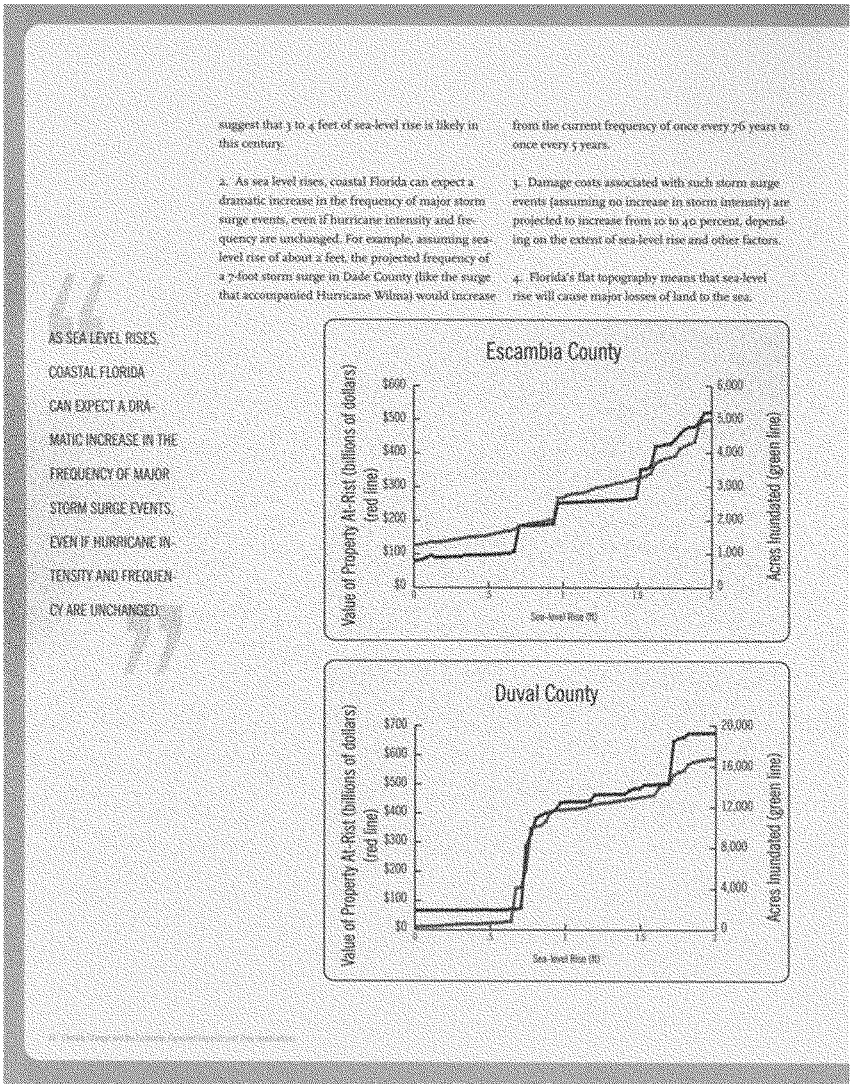
- SALT-WATER INTRUSION AFFECTING DRINKING WATER SUPPLIES
- HIGHER STORM SURGE AND INCREASED RISK OF FLOODING
- EROSION OF BEACHES AND BARRIER ISLANDS
- GREATER PROPERTY DAMAGES
- ADVERSE IMPACTS ON COASTAL ECOSYSTEMS INCLUDING FISHERIES

Key Findings

1. Sea level is already rising and will continue to rise in the future. This analysis used conservative estimates extrapolated from past trends. An increasing rate of sea-level rise is now being observed, and is projected to continue as polar ice sheets melt. This analysis assumed a range of sea-level rise from about 8 inches to about 2 feet. Recent studies

Land in Red is at Risk
Due to Sea-Level Rise in Dade County

The sea-level rise projections for this area range from about 0.16 feet to 2.3 feet within this century, with additional increases later.



suggest that 3 to 4 feet of sea-level rise is likely in this century.

2. As sea level rises, coastal Florida can expect a dramatic increase in the frequency of major storm surge events, even if hurricane intensity and frequency are unchanged. For example, assuming sea-level rise of about 2 feet, the projected frequency of a 7-foot storm surge in Dade County (like the surge that accompanied Hurricane Wilma) would increase from the current frequency of once every 76 years to once every 5 years.

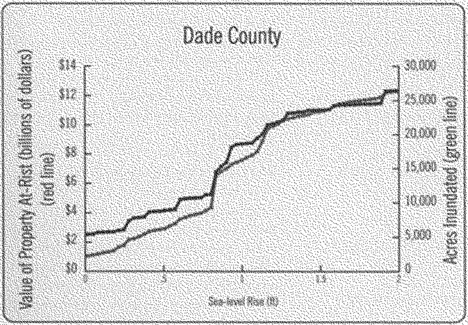
3. Damage costs associated with such storm surge events (assuming no increase in storm intensity) are projected to increase from 10 to 40 percent, depending on the extent of sea-level rise and other factors.

4. Florida's flat topography means that sea-level rise will cause major losses of land to the sea.

> "AS SEA LEVEL RISES, COASTAL FLORIDA CAN EXPECT A DRAMATIC INCREASE IN THE FREQUENCY OF MAJOR STORM SURGE EVENTS, EVEN IF HURRICANE INTENSITY AND FREQUENCY ARE UNCHANGED."

For example, if sea level rises about 2 feet, nearly 26,500 acres of land in Dade County alone would be inundated and permanently lost.

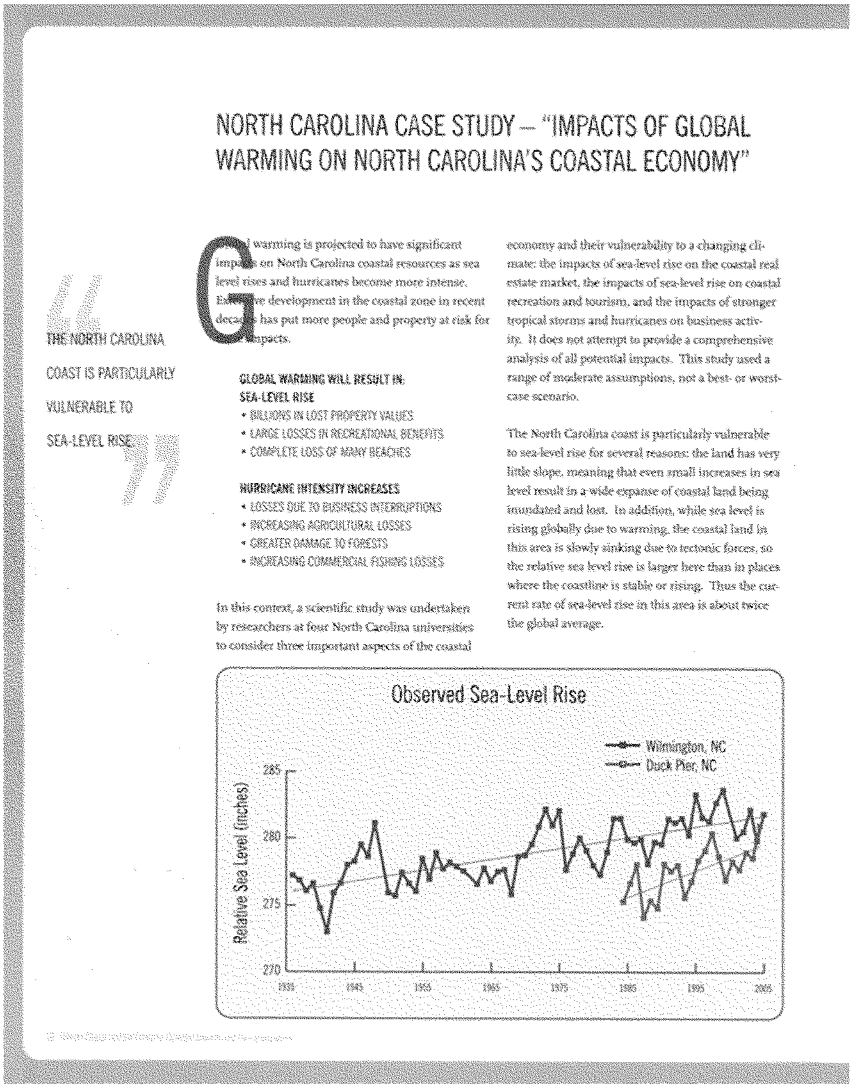
5. Property losses would increase in direct correlation to rising sea levels. If sea level rises by about 2 feet, property losses in Dade County alone would exceed $12 billion. These results, which do not account for future increases in coastal population or property values, suggest that significant property values are at risk along Florida's coast.



Effect of Storm Surge and Sea-Level Rise on Future Damage Costs

County	Hurricane	Historical Damage Cost	Future Damage Cost
Dade	Wilma	$2.21 billion	$2.9 billion
Dixie	Dennis	$0.06 million	$0.08 million
Duval	Frances	$72.3 million	$98 million
Escambia	Dennis	$70.7 million	$95 million
Monroe	Wilma	$215.3 million	$370 million
Wakulla	Dennis	$4.42 million	$6.9 million

> “PROPERTY LOSSES WOULD INCREASE IN DIRECT CORRELATION TO RISING SEA LEVELS. IF SEA LEVEL RISES BY ABOUT 2 FEET, PROPERTY LOSSES IN DADE COUNTY ALONE WOULD EXCEED $12 BILLION.”



NORTH CAROLINA CASE STUDY – "IMPACTS OF GLOBAL WARMING ON NORTH CAROLINA'S COASTAL ECONOMY"

> "THE NORTH CAROLINA COAST IS PARTICULARLY VULNERABLE TO SEA-LEVEL RISE"

Global warming is projected to have significant impacts on North Carolina coastal resources as sea level rises and hurricanes become more intense. Extensive development in the coastal zone in recent decades has put more people and property at risk for impacts.

GLOBAL WARMING WILL RESULT IN:
SEA-LEVEL RISE
- BILLIONS IN LOST PROPERTY VALUES
- LARGE LOSSES IN RECREATIONAL BENEFITS
- COMPLETE LOSS OF MANY BEACHES

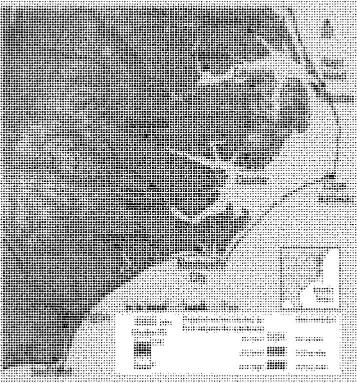
HURRICANE INTENSITY INCREASES
- LOSSES DUE TO BUSINESS INTERRUPTIONS
- INCREASING AGRICULTURAL LOSSES
- GREATER DAMAGE TO FORESTS
- INCREASING COMMERCIAL FISHING LOSSES

In this context, a scientific study was undertaken by researchers at four North Carolina universities to consider three important aspects of the coastal economy and their vulnerability to a changing climate: the impacts of sea-level rise on the coastal real estate market, the impacts of sea-level rise on coastal recreation and tourism, and the impacts of stronger tropical storms and hurricanes on business activity. It does not attempt to provide a comprehensive analysis of all potential impacts. This study used a range of moderate assumptions, not a best- or worst-case scenario.

The North Carolina coast is particularly vulnerable to sea-level rise for several reasons: the land has very little slope, meaning that even small increases in sea level result in a wide expanse of coastal land being inundated and lost. In addition, while sea level is rising globally due to warming, the coastal land in this area is slowly sinking due to tectonic forces, so the relative sea level rise is larger here than in places where the coastline is stable or rising. Thus the current rate of sea-level rise in this area is about twice the global average.

Observed Sea-Level Rise

Land in Red is at Risk of Loss Due to Sea-level Rise by 2100



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Key Findings

Property Losses

1. The value of property at risk to sea-level rise in just four counties over the next 75 years is $6.9 billion.

2. Projected losses in residential property values vary by county, with the northern counties comparatively more vulnerable than the southern. The property at risk in Dare County ranges from 2% to 12% of the total property value.

Recreation and Tourism Losses

3. The lost recreation value of climate change-induced sea-level rise to local beach goers is projected to be $93 million a year by 2030 and $223 million a year by 2080 for the southern North Carolina beaches.

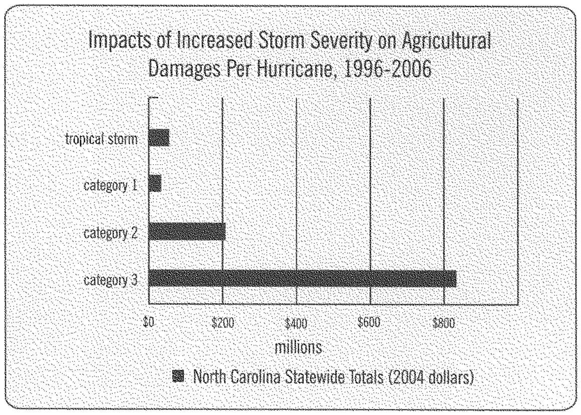
4. Spending by non-local North Carolina residents on beach trips would fall significantly with warming-induced sea-level rise, dropping by 16% per year by 2030 and by 48% per year by 2080.

5. Reduced opportunities for beach trips and fishing trips are projected to result in lost recreational benefits totaling $3.9 billion for the southern North Carolina beaches over the next 75 years.

Impacts to Business, Agriculture, and Forests

6. Increased hurricane intensity will interrupt businesses, reducing economic output to varying degrees, depending on location and the severity of warming. Business interruption losses in just four North Carolina counties due to increases in category 3 hurricane severity (excluding increases in all other categories) are projected to rise by $34 million per storm

> “REDUCED OPPORTUNITIES FOR BEACH TRIPS AND FISHING TRIPS ARE PROJECTED TO RESULT IN LOST RECREATIONAL BENEFITS TOTALING $3.9 BILLION FOR THE SOUTHERN NORTH CAROLINA BEACHES OVER THE NEXT 75 YEARS.”

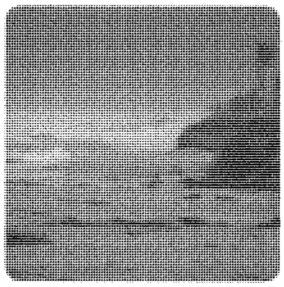


Impacts of Increased Storm Severity on Agricultural Damages Per Hurricane, 1996-2006

> INCREASED FOREST DAMAGE ASSOCIATED WITH AN INCREASE IN STORM SEVERITY FROM CATEGORY 2 TO CATEGORY 3 IS ABOUT 150% PER STORM EVENT, OR ABOUT $900 MILLION MORE IN DAMAGES.

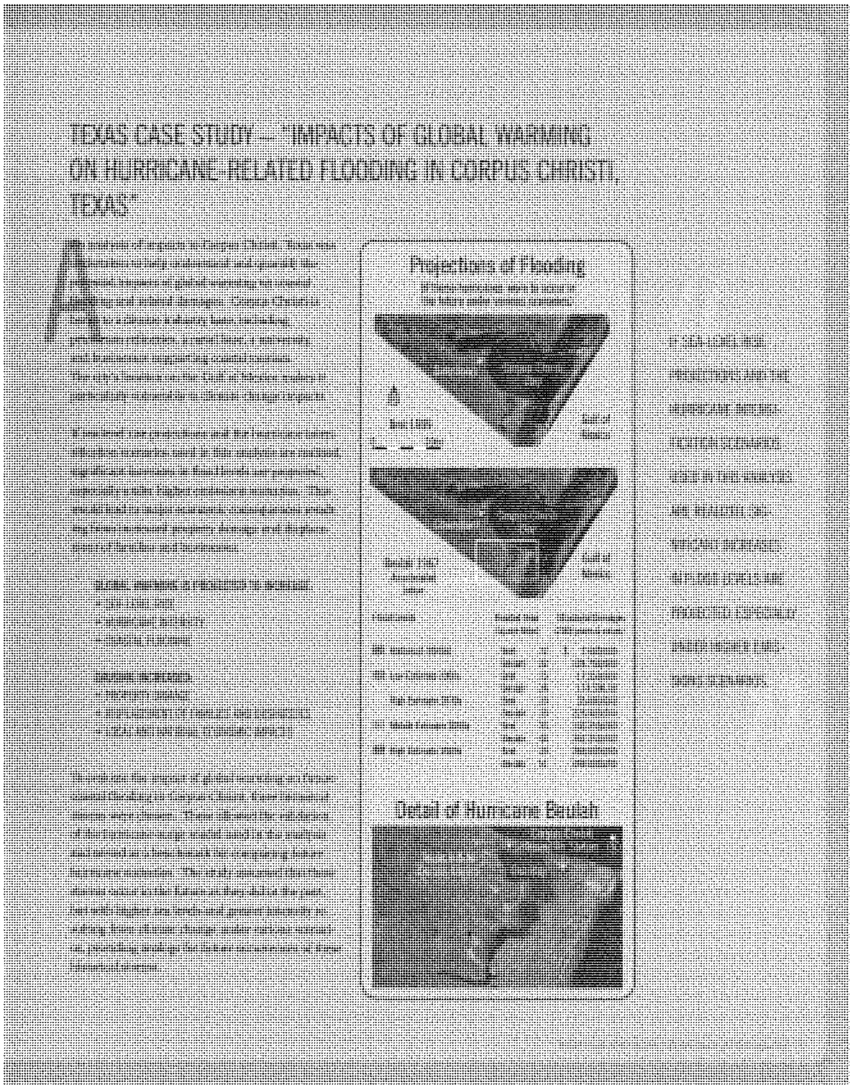
2030, and by $157 million per storm in 2080. Assuming no increase in hurricane frequency, the projected cumulative losses from 2004 to 2080 due to increased category 3 severity in these four counties amount to $1.44 billion.

7. Increasing storm intensity is expected to have serious impacts on agriculture. A category 1 hurricane now causes about $50 million in agricultural damage, a category 2, about $200 million, and a category 3, about $800 million, illustrating how significant an increase in hurricane intensity would be for this sector.



8. Increased forest damage associated with an increase in storm severity from category 2 to category 3 is about 150% per storm event, or about $900 million more in damages.

9. The four counties (New Hanover, Dare, Carteret, and Bertie) selected for the hurricane intensity analysis represent a range of geographic location and urbanization intensity. Changes among low-intensity hurricane categories were identified as the most likely impacts of climate change on storm intensity. Though low-intensity storms cause less physical damage than do high-intensity storms, low-intensity storms occur with much greater frequency, especially in North Carolina; thus, their cumulative economic impacts can be very large.

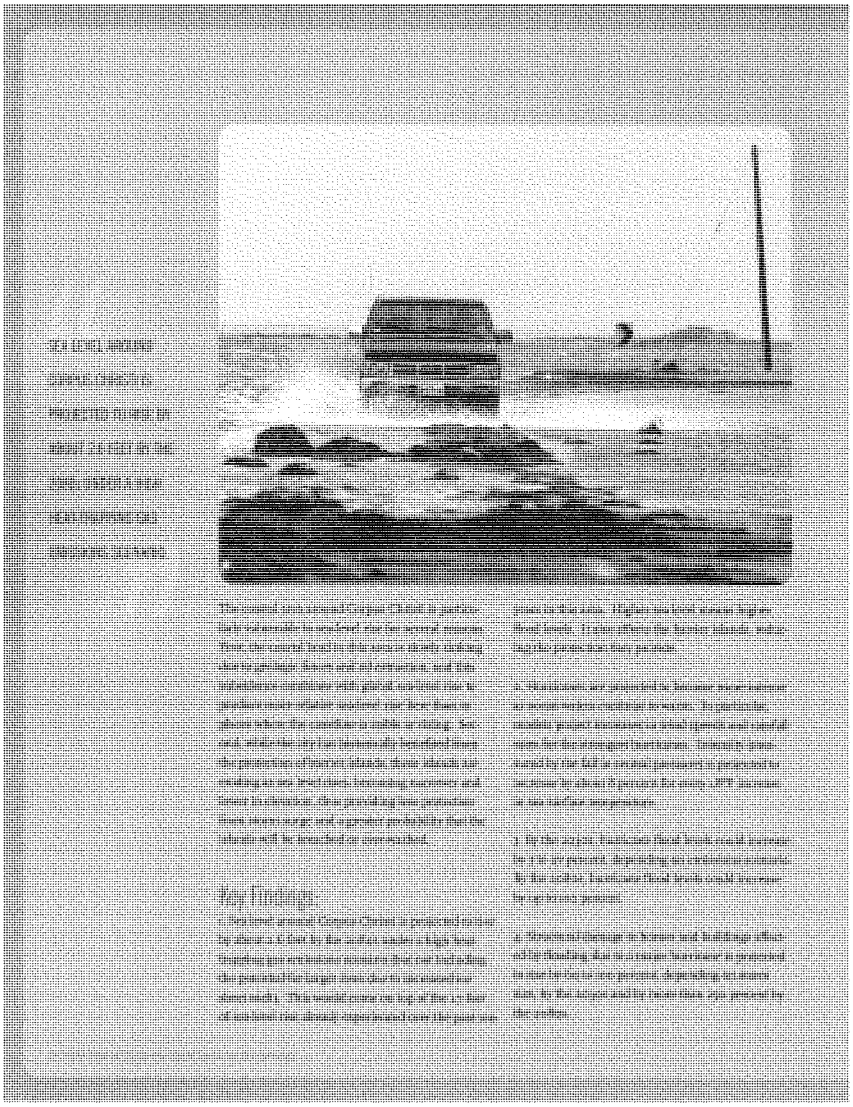


TEXAS CASE STUDY – "IMPACTS OF GLOBAL WARMING ON HURRICANE-RELATED FLOODING IN CORPUS CHRISTI, TEXAS"

Projections of Flooding

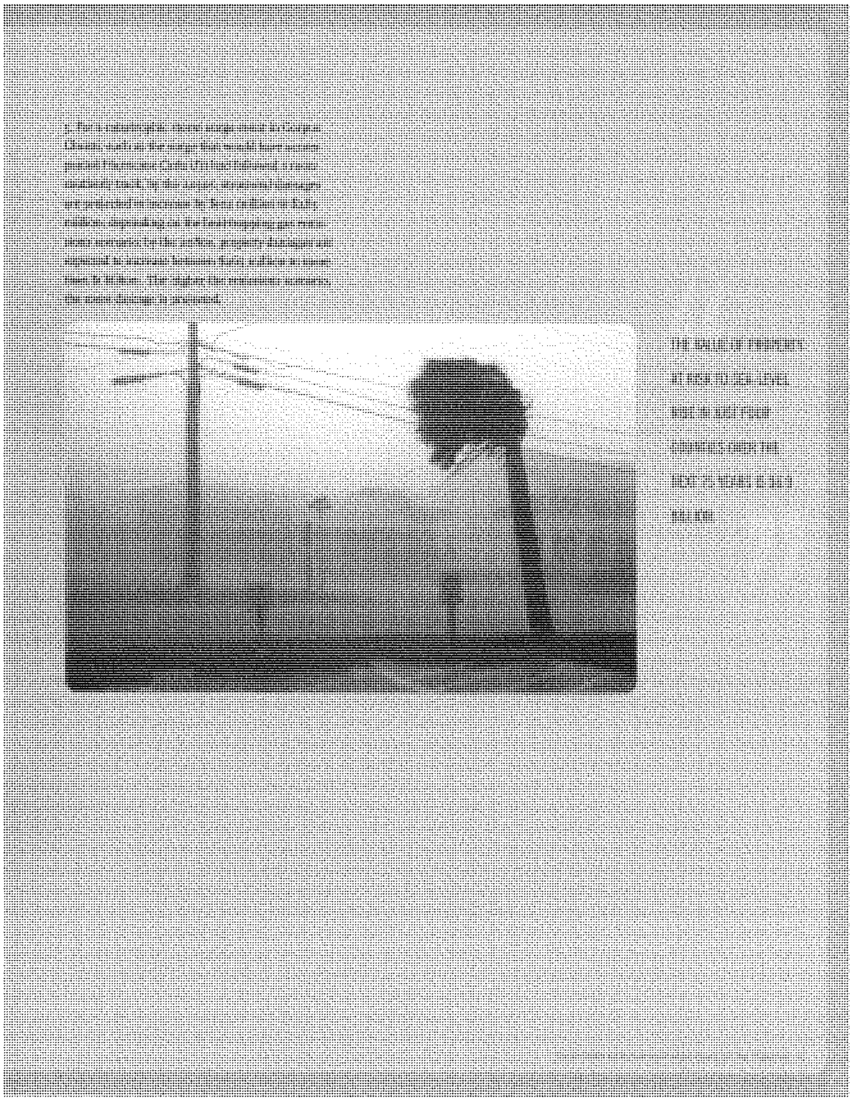
Detail of Hurricane Beulah

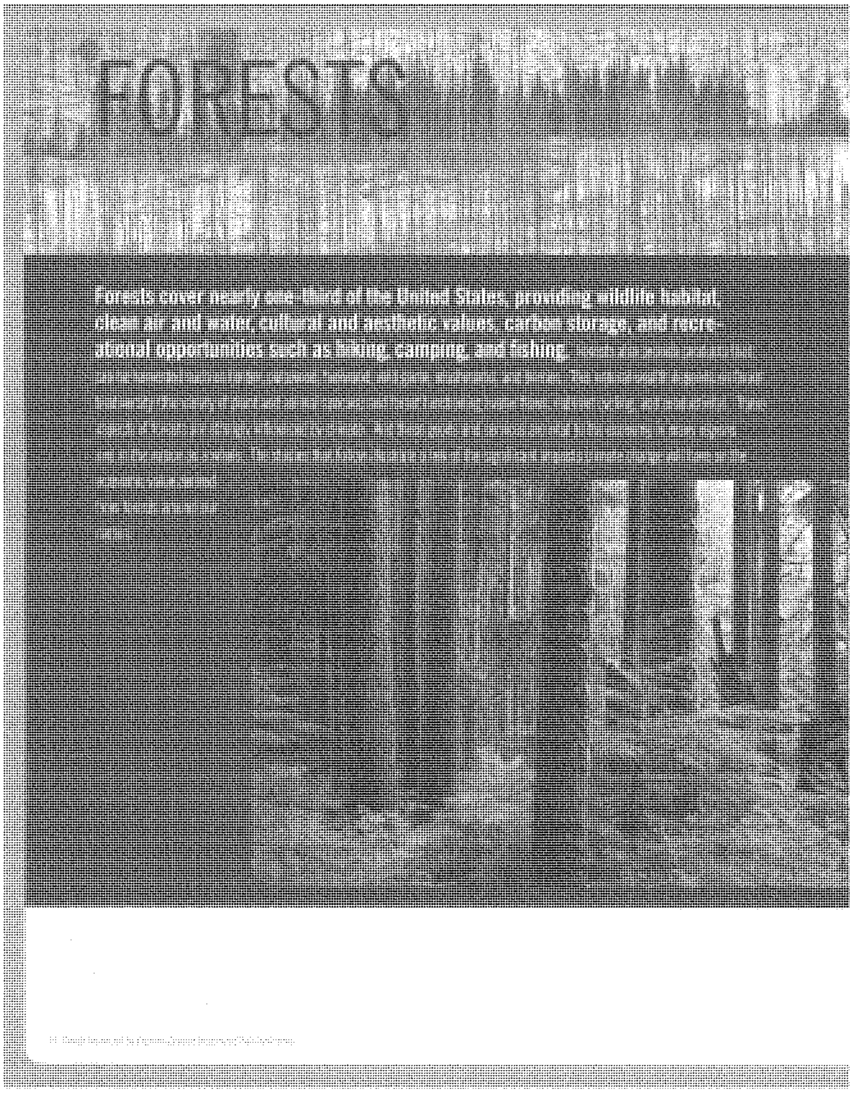
IF SEA-LEVEL RISE PROJECTIONS AND THE HURRICANE INTENSIFICATION SCENARIOS USED IN THIS ANALYSIS ARE REALISTIC, SIGNIFICANT INCREASES IN FLOOD LEVELS ARE PROJECTED, ESPECIALLY UNDER HIGHER EMISSIONS SCENARIOS.



SEA LEVEL AROUND
CORPUS CHRISTI IS
PROJECTED TO RISE BY
ABOUT 2.6 FEET BY THE

Key Findings





FORESTS

Forests cover nearly one-third of the United States, providing wildlife habitat, clean air and water, cultural and aesthetic values, carbon storage, and recreational opportunities such as hiking, camping, and fishing.

TENNESSEE CASE STUDY – "ECONOMIC IMPACTS OF CLIMATE CHANGE ON TENNESSEE'S FORESTS"

The U.S. forestry industry is concentrated in the southeastern region, where forests are especially diverse and where impacts from climate change are expected to be severe.

PROJECTED CLIMATE CHANGES INCLUDE:
- ALTERED SEASONAL WEATHER PATTERNS
- CHANGING PRECIPITATION

THIS COULD LEAD TO:
- CHANGES IN SOIL MOISTURE
- LOSS OF FOREST BIOMASS
- LOSS OF WILDLIFE HABITAT
- CHANGES IN THE DISTRIBUTION AND DIVERSITY OF PLANT AND ANIMAL SPECIES
- IMPACTS ON TOURISM AND RECREATION
- IMPACTS ON FOREST-RELATED INDUSTRIES

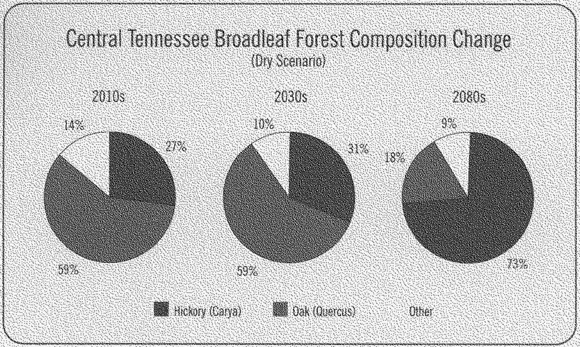
In Tennessee, the forestry industry directly and indirectly supports 257,700 jobs and contributes $22.8 billion to the state's economy. Tennessee's forests are home to more than 71 tree species and a great variety of other plants and animals – some of the most diverse forest ecosystems of the inland United States. Climate-related impacts on forests are therefore of special concern and potential economic significance. Changes in forest composition and temperature are likely to affect recreational pursuits – such as trout fishing – that play an important role in the state's economy and quality of life.

Key Findings:

1. Temperatures are projected to rise in all seasons. Projected changes in precipitation patterns are less certain and more complex.

2. Under most climate scenarios, total forest biomass is projected to decline over this century, with the largest reductions expected under dry scenarios. Southern Mixed Forest is projected to suffer significant forest die-off and substantial loss of biodiversity, losing nearly 90 percent of its biomass by 2080 under a dry scenario. Over the long term, on a time scale of several centuries, total forest biomass

> "CHANGES IN FOREST COMPOSITION AND TEMPERATURE ARE LIKELY TO AFFECT RECREATIONAL PURSUITS – SUCH AS TROUT FISHING – THAT PLAY AN IMPORTANT ROLE IN THE STATE'S ECONOMY AND QUALITY OF LIFE."



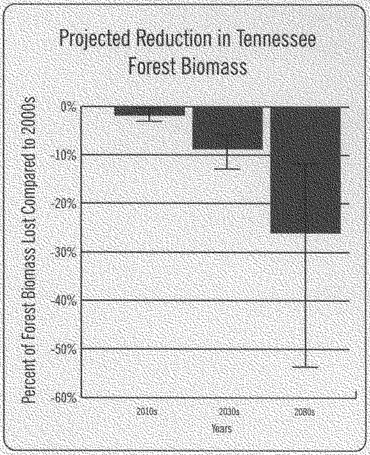
is expected to recover as tree species shift to those more suited to the new climate conditions.

3. Oak and other commercially important hardwoods are projected to decline, while hickories and other less valuable woods increase, with significant effects on the forests products industry.

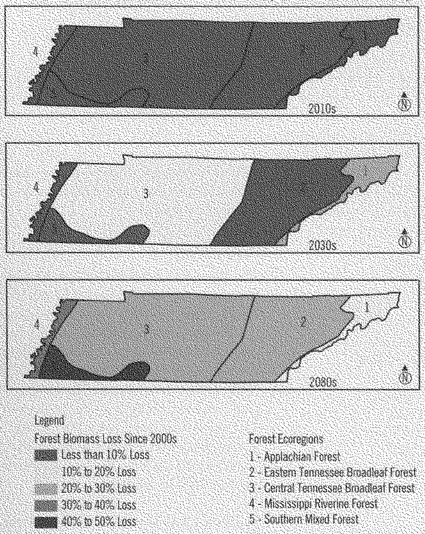
4. Tennessee's climate is projected to become less suitable and comfortable for tourism and recreation in the summer months, and more so from late fall to early spring. Activities such as rock climbing and whitewater boating are likely to benefit in the winter months. Winter activities dependent on snow are expected to decline, as are summertime activities such as lake recreation and camping.

5. A major decline in trout populations is expected as stream temperatures rise. This would have significant effects, as trout fishing is a popular and economically important activity in Tennessee. Loss of high-elevation spruce-fir forests will affect recreational pursuits including backpacking and bird watching.

> “WINTER ACTIVITIES DEPENDENT ON SNOW ARE EXPECTED TO DECLINE, AS ARE SUMMERTIME ACTIVITIES SUCH AS LAKE RECREATION AND CAMPING.”


Projected Reduction in Tennessee Forest Biomass

Tennessee Forest Biomass Loss (Base Year 2000s)


1
2
3
4
5
2010s
N
2030s
2080s
Legend
Forest Biomass Loss Since 2000s
Less than 10% Loss
10% to 20% Loss
20% to 30% Loss
30% to 40% Loss
40% to 50% Loss
Forest Ecoregions
1 - Applachian Forest
2 - Eastern Tennessee Broadleaf Forest
3 - Central Tennessee Broadleaf Forest
4 - Mississippi Riverine Forest
5 - Southern Mixed Forest

> “OAK AND OTHER COMMERCIALLY IMPORTANT HARDWOODS ARE EXPECTED TO DECLINE.”

MONTANA, WYOMING, AND IDAHO CASE STUDY — “IMPACTS OF CLIMATE CHANGE ON FORESTS OF THE NORTHERN ROCKY MOUNTAINS”

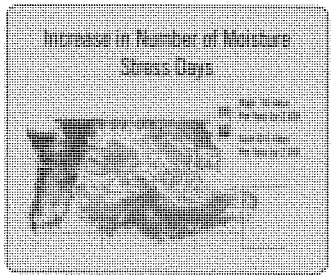
> “FORESTS ARE ALREADY RESPONDING TO OBSERVED CLIMATE CHANGE, AND THESE CHANGES ARE PROJECTED TO INTENSIFY IN THE COMING YEARS.”

The forests of the U.S. Northern Rocky Mountains are highly sensitive to projected climate change. Even under conservative projections of future climate change, dramatic effects on these forests are expected. Documented climatic changes in the last 50 years have significantly altered the conditions in which forests grow. Forests are already responding to observed climate change, and these changes are projected to intensify in the coming years.

CLIMATE CHANGE WILL CAUSE:
- RISING TEMPERATURES
- LESS SNOW, MORE RAIN
- LESS WATER STORED IN SNOWPACK
- EARLIER SPRING SNOWMELT AND PEAK RUNOFF
- LOWER STREAM FLOWS IN SUMMER

THESE CHANGES WILL LEAD TO:
- LONGER SUMMER DROUGHT
- INCREASED WATER STRESS
- MORE INSECT INFESTATIONS
- MORE INTENSE WILDFIRES
- LARGE ECONOMIC IMPACTS

Forests in relatively dry regions like the northern Rocky Mountains live in a perpetually water-limited state. During most of the growing season, when light and low temperatures do not limit growth, water is the most important limiting factor. Productivity depends on moisture conditions during the main part of the growing season. Spring, summer, and autumn temperatures, summer precipitation levels, and the previous winter's snowpack determine those moisture conditions.



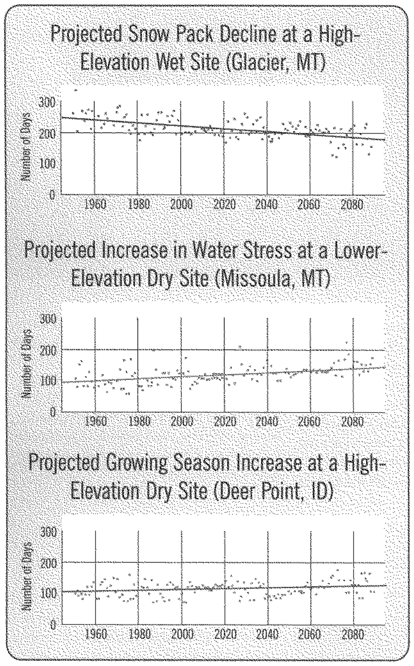
Water from Snowpack

Water storage in snowpack in the Mountain West is very important. Up to 75 percent of all stream water originates from snowmelt. Further, cold-season processes play an important role in the development of summer drought and fire risk. This study confirms the well-documented shift toward earlier runoff in recent decades attributed to more precipitation falling as rain instead of snow, and earlier snowmelt. Climate models project a continuation of these trends with an average of one-month earlier peak snowmelt and a significant decline in the number of days with snow on the ground per year.

Less snow is likely to increase the summer drought period, further increasing the number of days that trees experience water stress. At sites that presently depend on snowpack to maintain a forest canopy during summer months, models indicate that by the 2080s there would be little to no snowpack left.

Key Findings

1. As temperatures rise, projected changes in Northern Rocky Mountain forests include fewer days with snow on the ground, earlier peak snowmelt, a longer growing season, and about two months of additional summer drought stress each year by late this century.


Projected Snow Pack Decline at a High-Elevation Wet Site (Glacier, MT)

Projected Increase in Water Stress at a Lower-Elevation Dry Site (Missoula, MT)

Projected Growing Season Increase at a High-Elevation Dry Site (Deer Point, ID)

2. Increasing drought stress will increase forest disturbances including insect epidemics and wildfires. These disturbances have large impacts on society and the natural world.

3. If climate becomes drier, carbon uptake would be reduced to the extent that most forests in the region would switch from absorbing carbon to releasing it by late this century.

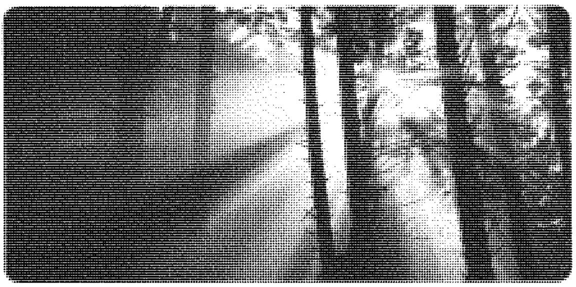
4. The economic impact of highest concern is the potential for a truly catastrophic wildfire in the region. There are now 360,000 people living in homes valued at $21 billion in the forest-urban interface in this region that are directly vulnerable to wildfire.

Future Climate Change

Climate projections for the northern Rocky Mountains over the course of this century include an annual average warming trend of 3.6 to 7.2°F. Lower emissions of heat-trapping gases will result in temperature increases near the lower end of this range and higher emissions near the higher end. Winter temperatures are projected to increase more than those in the other seasons. Precipitation, runoff, and streamflow patterns will also change, with both the amounts of water and the timing of runoff and streamflow being affected.

Over the course of this century, the growing season in the northern Rocky Mountains is expected to increase by about two months. Spring snowmelt will occur four to six weeks earlier, and the summer drought period will be six to eight weeks longer. The growing season will shift one to two months earlier in the spring. Late summer drought will be extended by six to eight weeks. One of the results of this extended drought will be an increased risk that small streams will dry up.

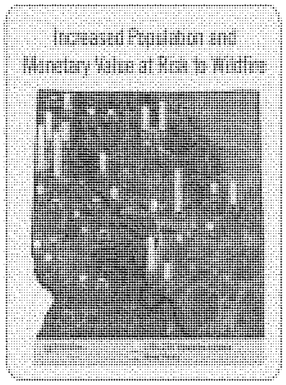
> "THERE ARE NOW 360,000 PEOPLE LIVING IN HOMES VALUED AT $21 BILLION IN THE FOREST-URBAN INTERFACE IN THIS REGION THAT ARE DIRECTLY VULNERABLE TO WILDFIRE."



> THE LONGER AND MORE INTENSE SUMMER DROUGHT PERIOD PROJECTED FOR THIS REGION LIMITS THE POTENTIAL POSITIVE EFFECTS OF A LONGER GROWING SEASON.

Forest Productivity

Warming increases growing season length, which is often associated with increased forest productivity, especially in high latitudes where temperatures constrain productivity in certain parts of the year, as is the case in this region. Under non-water-limited conditions, temperature is most likely a major driver of plant productivity. However, the longer and more intense summer drought period projected for this region limits the potential positive effects of a longer growing season.



A longer growing season and increased carbon dioxide in the air might be expected to increase plant productivity and carbon uptake, but this study shows limited productivity increases and a one- to three-month increase in the number of days in which trees are water stressed across the region, despite increases in growing season length, suggesting that in these forest ecosystems, water availability is the main control on productivity.

Forest Carbon Storage

Some forests that are now net absorbers of carbon dioxide from the air on an annual basis may begin releasing carbon dioxide by the end of the century. This would occur as carbon released through plant respiration exceeds carbon taken up by photosynthesis during the longer drought season. Even more significantly, the potential for large-scale insect outbreaks and wildfire will increase, causing even more carbon to be released and reducing the number of trees available to absorb carbon dioxide.

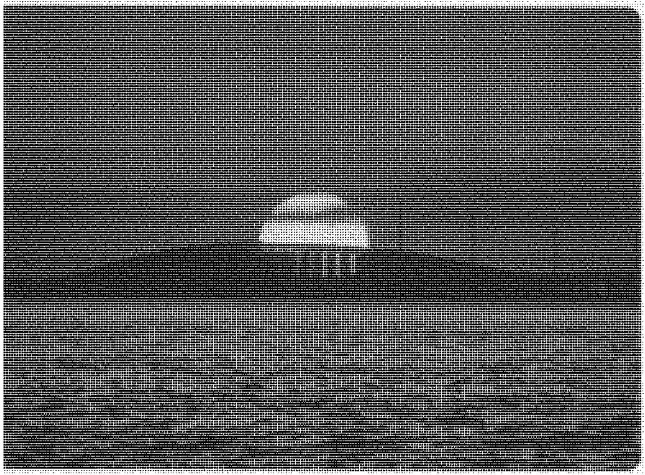
Pronounced declines in forest carbon uptake in parts of this region are projected, especially if climate becomes drier. Under drier scenarios, much of the region is actually projected to switch from absorbing carbon to releasing it – that is, becoming a carbon source rather than a carbon sink. This could have enormous significance given the importance of high-latitude mountainous forest sites in global carbon uptake.

CONCLUSIONS

Many impacts of climate change, including rising temperatures, increasing heavy downpours, rising sea level and hurricane intensity, and reduced water supplies will present increasing challenges around the nation. Economic impacts to the United States will be substantial, and will increase with additional warming.

The good news is that it is not too late to prevent the worst of these impacts. All analyses show that reducing heat-trapping emissions will reduce warming and associated impacts. The science is also clear that choices made now will determine the severity of the impacts we will face in the decades and centuries to come. The need to change the trajectory of heat-trapping gas emissions is urgent if we are to avoid dangerous climate change. The cost of inaction will be much higher than the cost of action.

THE GOOD NEWS IS THAT IT IS NOT TOO LATE TO PREVENT THE WORST OF THESE IMPACTS. ALL ANALYSES SHOW THAT REDUCING HEAT-TRAPPING EMISSIONS WILL REDUCE WARMING AND ASSOCIATED IMPACTS.



LIMITATIONS TO STATE CASE-STUDIES

Water resources

"Impacts of Global Warming on New Mexico's Water Resources: An Assessment of the Rio Grande Basin"

There are many limitations in the capability to measure and express the economic consequences projected to result from changes that affect the regional character and economy in such profound ways, much less the social and ecological values that cannot be expressed in economic terms. These limitations, coupled with some optimistic assumptions suggest that this analysis underestimates some of the future economic impacts of warming on New Mexico's hydrologic system. First, the analysis assumed that changes in future water use would reflect the uses with the highest monetary value. The analysis also assumes efficiently functioning water markets in which buyers and sellers are motivated by their private economic interests. In actuality, the potential for significant economic and legal conflict could be costly and unavoidable. Another assumption that reduces the projected costs is that this study assumes that future runoff and streamflow conditions are known with certainty and that adjustments and adaptations, in the form of storage and use decisions, would be optimally executed without errors in amount or timing of adjustments.

There are other issues not considered in this study that might contribute to economic losses. Decreasing agriculture will mean a reduction in open space and the many services it provides, such as wildlife habitat and scenic landscapes, that are not valued in monetary terms. Damaging effects are projected to result from the potential increases in flooding due to more frequent and intense monsoonal storms. This study is based on monthly averages and does not consider the effect of individual storms. Warming-induced drying of New Mexico's soils will further stress rangeland vegetation, adversely affecting the beef cattle industry that provides 40% of New Mexico's agricultural income. Drying increases the frequency and severity of forest fires. Tourism may be adversely affected by the degradation of scenic and recreational opportunities. Finally, detrimental impacts on water quality could result as reduced streamflows lower the capacity of streams to assimilate pollutants

Infrastructure

"Costs of Global Warming for Alaska's Public Infrastructure"

Privately owned infrastructure, such as homes, businesses, and industrial facilities, are excluded from this analysis. Counting of public infrastructure is incomplete due to data limitations (for example, data are not available for many military installations due to security issues). The Trans-Alaska pipeline was not included. The analysis only considers infrastructure already built today; it does not anticipate future infrastructure and the extra costs warming would impose on such projects as a planned natural gas pipeline. Many assumptions about future warming as well as its impacts on infrastructure had to be extrapolated from a limited number of data points. Sea-level rise was not taken into account in this analysis. Although three different climate models are used to illustrate three possible levels of future warming, all three models used the same emissions scenario, a middle-of-the-road scenario that assumes high economic growth and energy use, low population growth, and rapid technological advances. Higher and lower emissions scenarios were not analyzed. Thus the range of economic costs shown here is only a small part of the possible range. The actual costs will depend largely on the level of emissions of heat trapping gases, with higher emissions resulting in more warming and higher costs.

Sea-Level Rise and Major Storm Events

"Climate Change in Coastal Florida: Economic Impacts of Sea Level Rise"

Estimates of future sea level rise vary widely because there is still substantial uncertainty about this category of climate-change impact. Linking changes in sea level to future storm impacts and damages compounds these uncertainties. Because the Florida State University study did not account for changes in property values over time or the likelihood that population and development along the coast would continue to grow it likely understates future impacts from sea-level rise. On the other hand, the study also did not account for adaptation measures that might be undertaken by property owners to reduce losses or damages in the future. Finally, the study does not address the possibility that global warming will likely increase the intensity or severity of Atlantic hurricanes—all of the damage estimates are based on changes in expected storm surge due solely to sea level rise. Accounting for a likely increase in storm intensity would almost certainly push damage estimates higher, perhaps significantly.

"Impacts of Global Warming on North Carolina's Coastal Economy"

This study used a range of moderate assumptions about warming and sea-level rise, not best- or worst-case scenarios. Its focus was only the specific economic impacts mentioned in the text, and as such, it does not attempt to provide a comprehensive analysis of all potential impacts, such as the possible loss of species or the natural ecosystems in which they live.

"Impacts of Global Warming on Hurricane-related Flooding in Corpus Christi, Texas"

This analysis looked only at damages due to flooding by storm surge and sea-level rise. It is not a comprehensive analysis of the wide array of hurricane-related damages. Other simplifying assumptions were made and there were limitations due to lack of data. For example, no data on historical flood damage to oil refineries was available to the researchers. In addition, the study assumes that the barrier island retains its elevation and volume as sea level rises, though under high rates of sea-level rise, the relative condition of the barrier island would be expected to weaken, posing additional risk for erosion of the island and for flooding in the bay, both of which would increase economic damages. For large storm surges, structural damage on the barrier islands might be as much as $1.3 billion, if all homes on the island were completely destroyed.

Further, the appraised property values used in the study are lower than the values of properties listed for sale. Damage estimates using the listed values of homes would be more than 30% higher. Actual property damages for future scenarios will also likely be higher than projected in this study in response to the current trends of increased population and infrastructure construction along the coast. Other factors not considered in this analysis include future population growth, the possible acceleration in property values, and adaptation measures that might be taken by property owners to reduce losses.

While the results presented here offer an indication of the expected increase in damages as a result of global warming, the estimates are most likely low. Furthermore, the broader impact of hurricane damage to the local and national economy was not considered. Because Corpus Christi is a tourist area, local tourism revenue and other business-related revenue will likely be slower to recover following storms of higher intensity. There is also an increasing risk to the national economy, mainly because of Corpus Christi's role in the petroleum industry. Finally, potential community adaptation to accelerating flood levels was not included in this analysis.

Forest Resources

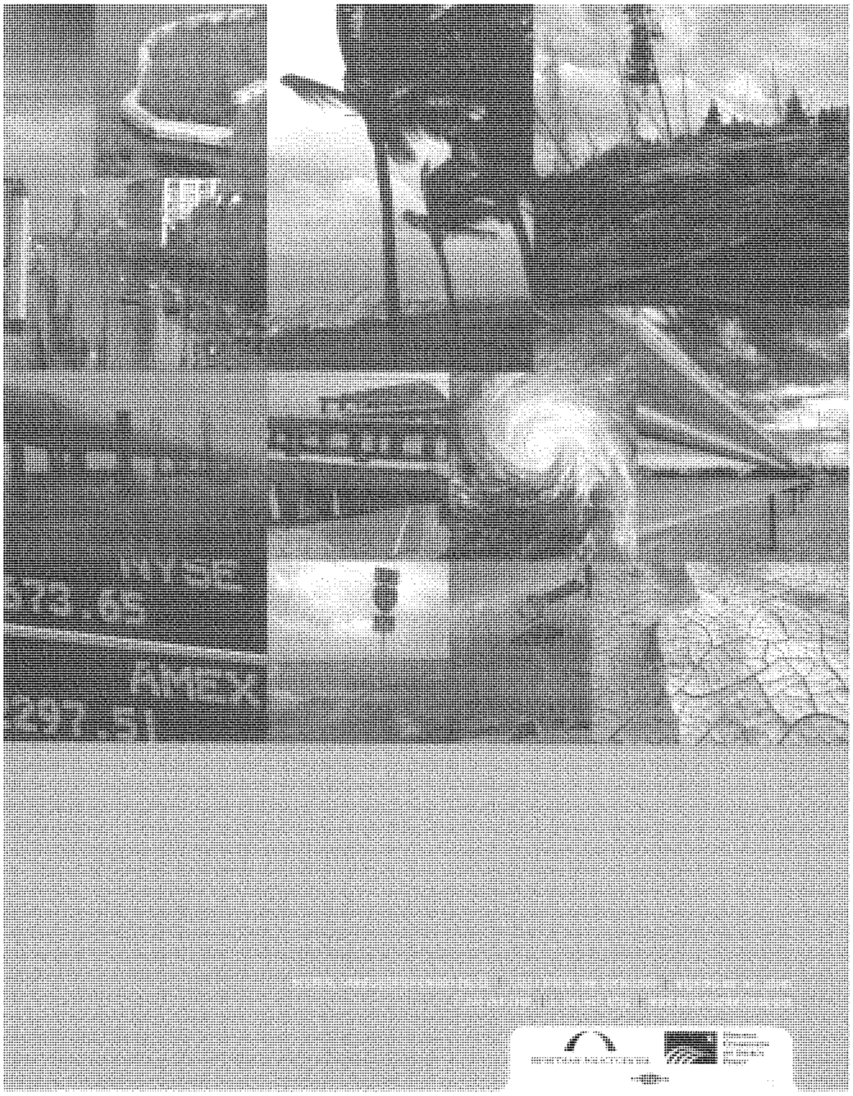
"Impacts of Climate Change on Tennessee's Forest Ecosystems"

Predicting the effects of global warming on forests is inherently difficult given the complexity of these ecosystems and the wide variation in results produced by different climate models and input assumptions. The uncertainties are compounded when one attempts to extrapolate to estimates of economic and other impacts. Several factors were not accounted for in this analysis, including the effect of higher atmospheric carbon dioxide concentrations on tree growth, the possibility that global warming would continue into the next century (the analysis assumes that the climate stabilizes in 2080), the potential for climate change to intensify the risk of southern pine beetle infestations, and the possible impact of warming temperatures and lower moisture on the frequency and severity of forest fires. Ultimately, the future of Tennessee's forests will also be affected by a host of external forces – such as shifting land-use patterns, economic changes, and adaptations by the forestry industry – that will inevitably interact with the changes wrought by a warming climate.

"Impacts of Climate Change on Forests of the Northern Rocky Mountains"

Processes not yet included in the models, including disturbances such as fires, may initiate unforeseen feedbacks. Forests themselves have significant effects on the hydrologic cycle and atmospheric composition, but are barely considered in the current generation of models. Also omitted were changes in species composition, and changes in patterns of factors such as precipitation that may have potentially stronger effects on ecological systems than do changes in average conditions used in this study. Recently reported increases in drought-induced death of trees would also change the landscape and forest dynamics.

The omission that most affects this study is that of large-scale disturbances such as wildfires and insect outbreaks. These disturbances are already on the rise and are projected to increase further due to increases in the number of water-stress days and reductions in snowpack. Water stress levels and snowpack levels are the two main predictors of wildfire vulnerability and factors in insect outbreaks. Reduced winter precipitation and earlier spring snowmelt already contribute to the recent increase in large wildfire activity. The Northern Rockies forests are very sensitive to changes in the water balance. The impacts of disturbance in reducing carbon stocks and productivity have been demonstrated. The results of this study point toward increased fire and insect activity.


NYSE
573.65
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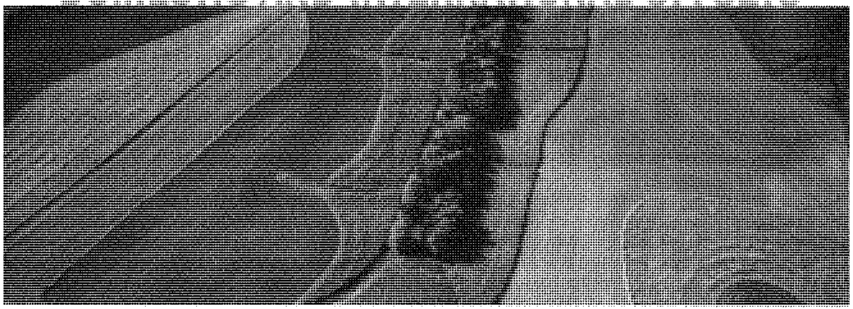
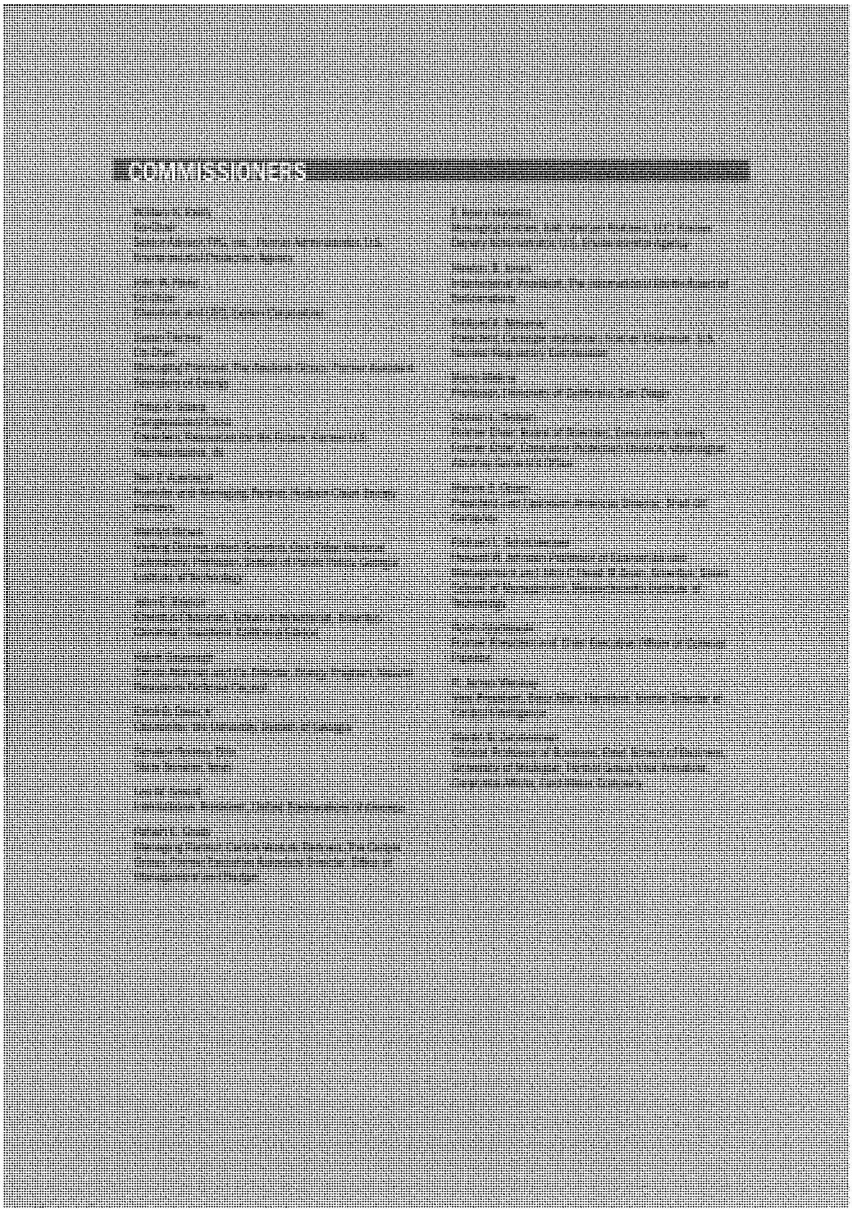
297.51

National
Commission
on Energy
Policy

DOMESTIC AND INTERNATIONAL OFFSETS



FORGING THE CLIMATE CONSENSUS



COMMISSIONERS

Offsets can and should play a critical role in a U.S. climate policy.

However, an offsets program by itself ***is unlikely to provide*** an adequate mechanism for managing economic risks in a ***cap-and-trade program.***

INTRODUCTION

Emission offsets play a prominent role in recent legislative proposals to establish a cap-and-trade system for limiting U.S. greenhouse gas emissions. Under the Waxman-Markey bill recently passed by the House of Representatives, most of the emission reductions called for in the early years of the program could theoretically come from offset credits. Other proposals, such as the Lieberman-Warner bill introduced in the Senate last year, likewise allow for substantial reliance on offsets (up to 30 percent) to meet future compliance obligations. These provisions have a major impact on estimates of the economic consequences of a greenhouse gas cap-and-trade program—in fact, modeling analyses conducted by the U.S. Environmental Protection Agency (EPA) find that expected per-ton allowance costs in 2020 vary nearly two-fold between scenarios that exclude international offsets, on the one hand, and scenarios that allow for their unconstrained use on the other. Similar results emerge from modeling analyses conducted by the U.S. Energy Information Administration (EIA), which has likewise evaluated the economic impacts of different cap-and-trade proposals.[1]

Offsets reduce program costs and increase regulatory flexibility by allowing companies to take advantage of low-cost abatement opportunities outside the cap-and-trade system. Domestic sources of offsets in the context of a U.S. program could include otherwise unregulated sources of emissions as well as soil or forest-based carbon sequestration. Because many of these abatement opportunities are in the agricultural sector, domestic offsets could provide a significant source of income to farm communities. International offsets could come from emission abatement activities (such as efficiency or renewable energy projects) in countries that have not yet adopted greenhouse gas regulations and from land-use-based carbon sequestration (e.g. projects that avoid deforestation or promote afforestation). In particular, the benefits of avoiding tropical deforestation could be substantial, as deforestation contributes about 20 percent of global greenhouse gas emissions.[2] Thus, international offsets could provide a critical source of private-sector financing for measures that will help preserve forests and transform energy systems around the world. Eligibility to participate in an international offsets program could also create incentives for other countries to open their markets to U.S. technologies, and for key developing nations to strengthen their own climate commitments.

Because they have the potential to lower program costs and offer multiple other benefits, offsets enjoy support from a broad range of stakeholders—including the business community and environmental advocates—and will almost certainly be part of final U.S. climate legislation. The more controversial and interesting questions concern what role—and how large—this alternate compliance option will play, and what the practical implications of implementing a major offsets program might be. More specifically, to what extent does the inclusion of offsets provide adequate protection against the potential for adverse economic impacts related to cost and price volatility in carbon markets? And what provisions for monitoring, evaluation, and

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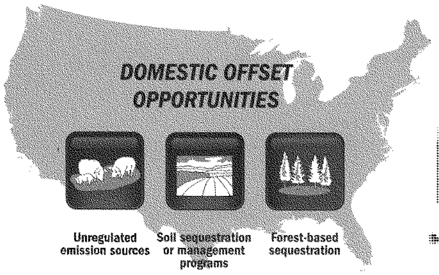
[1] *Environmental Protection Agency. Analysis of H.R. 2454, the American Clean Energy and Security Act of 2009. June 2009. Energy Information Administration. Energy Market and Economic Impacts of H.R. 2454, the American Clean Energy and Security Act of 2009. August 2009.*

[2] *N. Purvis, R. Kopp, and A. Stevenson. "Managing Climate-Related International Forest Programs," Issue Brief #09-07. June 2009.*


DOMESTIC OFFSET OPPORTUNITIES
Unregulated emission sources
Soil sequestration or management programs
Forest-based sequestration

verification need to be in place to assure the environmental integrity of an offsets program, while still promoting innovation and capturing the potential benefits of robust participation?

This paper outlines the Commission's most recent thinking on offsets in the context of current proposals before Congress. In the process, we provide some background on offsets generally and review the main offset provisions of the Waxman-Markey bill and recent Senate bills. We begin by summarizing the chief insights and recommendations that have emerged from our own exploration of these issues.

KEY POINTS AND RECOMMENDATIONS

- Offsets can and should play a critical role in a U.S. climate policy. However, an offsets program by itself is unlikely to provide an adequate mechanism for managing economic risks in the critical early years of a cap-and-trade program. The Commission's specific recommendations concerning cost containment, along with a more complete discussion of related issues, are the subject of a separate paper in this series.[3]

- It is impossible to predict with accuracy how many offsets will be available in the early years of a U.S. cap-and-trade program. This is particularly true for international offsets. The number of these offsets used for compliance will depend on a variety of factors, including rules for "additionality," administrative procedures for reviewing projects, policies in host countries, and the ability to negotiate agreements for broader, sectoral offsets. Based on past experience with offset programs, however, we would expect the international offset market to ramp up slowly compared to some of the more optimistic estimates associated with the recent House-passed climate legislation. We therefore believe it is unlikely that U.S. purchases of international offsets would exceed 300 million tons of carbon dioxide-equivalent credit per year during the first several years of the program.

- The inclusion of a price ceiling or a robust allowance auction reserve in the early years of a cap-and-trade program for greenhouse gas emissions would ease the pressure for short-term reliance on international offsets as the primary mechanism for managing program-related economic risks. This, in turn, should make it less likely that there will be design and implementation decisions that prioritize quick approval of large quantities of offset credits over the objectives of maintaining environmental integrity and promoting the strategic engagement of developing countries.

- Regarding domestic offsets, we believe there should be a "set-aside" program that dedicates

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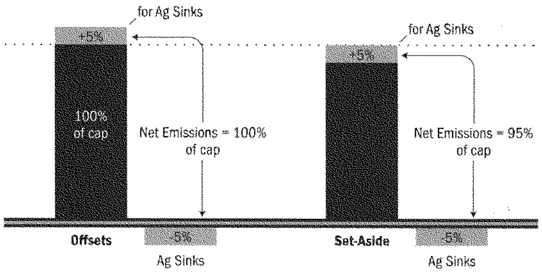
[3] *Multiple prior Commission reports and staff papers can be found at www.bipartisanpolicy.org.*

OFFSET AND SET-ASIDE OPPORTUNITIES FOR AGRICULTURAL SEQUESTRATION



A side-by-side depiction of an "offsets" system and an "allowance set-aside" system and the role of agricultural soil sinks within those systems, as described in this report. Sequestration practices on agricultural or forested lands would be able to apply for credit under the domestic offset or the set-aside provision.

a percentage of allowances—say 2 percent to 5 percent—to reward eligible agricultural sequestration practices. Using emission permits to, in essence, "insure" new and innovative sequestration activities will make it possible to create a more streamlined approach than under a traditional offset regime, one that can be used to reward early action and promote experimentation while avoiding burdensome administration and accounting rules and reducing uncertainty as new measurement and verification protocols are being developed.[4] Depending on the type of project, farmers and other owners or managers of agricultural or forested lands would be able to apply for credit under either the domestic offset or the set-aside provision. We believe that having this set-aside option available for soil carbon sequestration *in addition* to a domestic soil carbon offset provision would ensure that activities receiving domestic soil carbon offsets would be evaluated more rigorously.

▶ By reducing the pressure to process huge numbers of offsets in the early years of a cap-and-trade program, the cost containment mechanisms and soil carbon set-aside discussed above will help preserve the integrity and ultimately the viability of international and domestic offset provisions. At the same time, key questions remain to be resolved concerning the methodologies used to assess offset credits and the rigorous monitoring and baseline rules needed to ensure that offsets can be an enduring mechanism to address the costs of a climate program. Past offset programs have shown that even a small number of imperfectly documented offset credits could significantly undermine confidence in the emerging offset market. There is every reason to expect continued controversy, critical media attention, and a high degree of scrutiny by NGOs and oversight bodies. This dynamic has the potential to stifle innovation and slow the learning that is needed to realize the full potential of domestic and international offsets. If and only if these types of safeguards are in place, the Commission would support removing quantity limits on offsets during the first decade of a cap-and-trade program.

▶ In addition to reducing costs, an international offsets program should engage developing countries in ways that induce more significant commitments on greenhouse gas emissions. The Commission believes that the development of sectoral offset programs and "offset aggregator" institutions are potentially important innovations and should be explored as part of a U.S. climate program. At the same time, these approaches raise a number of questions and may take time to develop. Thus, we don't support an approach that would rely solely on these types of mechanisms at the beginning of the program and believe that a robust project-based offset program should go forward while sectoral or aggregated offset options are being developed.

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[4] *For example, set-aside credits could be awarded to farmers to continue conservation tillage practices that began prior to the implementation of the cap-and-trade program.*

- Finally, the Commission recommends that Congress establish guidelines for an international offsets program and authorize the appropriate federal agencies to periodically review and, if necessary, modify the details of program design and implementation to be responsive to evolving economic, policy, and diplomatic developments.

BACKGROUND AND CONTEXT

This section provides a brief overview of offsets, summarizing their potential advantages and disadvantages, reviewing experience with offset programs to date, and highlighting key issues in the current Congressional debate.

RATIONALE FOR INCLUDING OFFSETS: Put simply, offsets substitute a lower-cost emission reduction from sources or sinks outside of an emission cap for a higher-cost reduction at sources covered by the cap. The result can be significant cost savings with the same environmental results. A report commissioned by NCEP in 2007 pointed out some of the ways that offsets can lower compliance costs for emission sources under a cap.[5] These include:

- Allowing covered sources to continue utilizing economic assets until the end of their useful lives, thereby avoiding the premature retirement of such assets;
- Providing covered sources with low-cost compliance options in the near term while lower-carbon technologies are developed;
- Avoiding deployment of long-lived capital assets using only marginally better technologies; and
- Stimulating innovation in sectors that are not usually subject to emission reduction requirements, thus providing important environmental benefits that may not occur otherwise.

As we have already noted, economic analyses of various climate bills have consistently illustrated this cost-saving potential. To the extent that the inclusion of offsets reduces program costs, it helps address concerns about the potential adverse impacts of a greenhouse gas cap-and-trade system on consumers, energy-intensive industries, and the U.S. economy as a whole. Put another way, offsets make tighter emission caps more affordable and can help win political support for a more stringent policy. As we also noted in the introduction, international offsets in particular can provide important additional benefits by creating incentives for the adoption of low- and no-carbon technologies and forest preservation in key developing countries.[6]

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[5] *Natsource. "Realizing the Benefits of Greenhouse Gas Offsets: Design Options to Stimulate Project Development and Ensure Environmental Integrity," January 2007.*

[6] *The developing countries with the most cumulative forestry mitigation potential by 2030 are Brazil, Indonesia, Mexico, India, and China. See Sathaye, J. A. et al. "Carbon Mitigation Potential and Costs of Forestry Options in Brazil, China, India, Indonesia, Mexico, the Philippines and Tanzania" Mitigation and Adaptation Strategies for Global Change, 2001, Vol. 6, Nos. 3-4, pp. 185-211.*

INHERENT CHALLENGES: Despite the potential benefits of offsets, efforts to apply this concept in practice have encountered a series of implementation challenges. Experiments with offsets under the U.S. Clean Air Act date back more than 30 years and have been characterized by limited volume, lengthy review processes, and in some cases questionable environmental integrity.[7] Most recently, the Clean Development Mechanism (CDM) set up under the Kyoto Protocol to promote greenhouse gas abatement activities in developing countries has had mixed results. (We return to some lessons from the CDM experience below.)

Why have offsets not lived up to their potential? In part, because it is often difficult to establish precisely how much abatement value they provide. To qualify for offset credits, it is generally necessary to demonstrate that emission reductions are additional—that is, the reductions would not have occurred absent the project or measure being credited. If credits are granted for emission reductions that would have happened anyway and if these credits are used to substitute for otherwise mandated reductions, the result will be higher-than-intended overall emissions—effectively undermining program objectives. As one report notes, calculating offsets necessarily entails "estimating the unknown"—in other words, establishing an emissions baseline or counterfactual, in which the project does not exist and against which project benefits can be measured.[8] This can be difficult under the best of circumstances. Other qualifying criteria commonly applied to offsets include permanence, verifiability, and enforceability, each of which can present its own practical and analytical challenges.

The need to establish additionality and meet other project criteria creates difficult tradeoffs. For example, a program with a simplified test for additionality could lower administrative and transaction costs and could facilitate the approval of more projects, thus generating more credits and lowering the costs of a cap-and-trade program. But for some project types, a simpler, more streamlined approach could also increase the chance that projects that are not truly additional make it through the review process. On the other hand, if the rules are overly tight, legitimate projects may get screened out even if they do result in true emission reductions beyond what would otherwise have occurred. Excessive administrative costs, a complex approval process, and uncertainty could also discourage investors from going forward with projects in the first place, reducing the supply of offsets and foregoing the cost-reducing benefits they would otherwise provide. Ultimately, there is no perfect test for additionality and no perfect compromise between program rigor and environmental certainty on the one hand, and maximum cost-reduction and administrative simplicity on the other hand. A balance must be struck and this requires a policy, rather than a technical decision.[9]

ISSUES SPECIFIC TO DOMESTIC OFFSETS: For any cap-and-trade program, the supply of domestic offsets is limited to those emission sources that are not already underneath the cap. Broader coverage of

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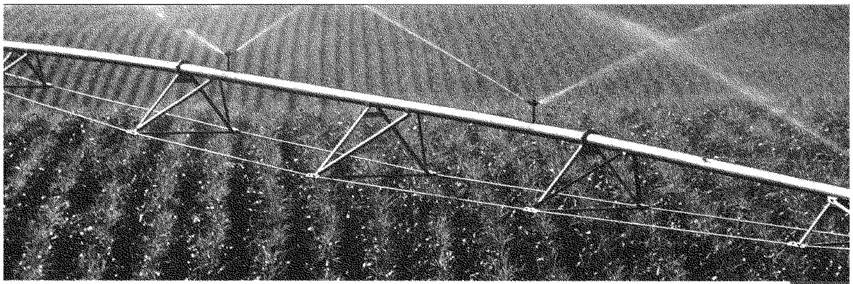
[7] *For example, see Ellerman, A. D., Joskow, P. and Harrison, D., "Emissions Trading in the U.S.: Experience, Lessons, and Considerations for Greenhouse Gases," prepared for Pew Center on Global Climate Change, May 2003. Environmental Law Institute (2002). "Emission Reduction Credit Trading Systems: An Overview of Recent Results and an Assessment of Best Practices." Environmental Law Institute. Robert H. Hahn and Gordon L. Hester: Marketable Permits: Lessons for Theory and Practice, Ecology Law Quarterly, Vol. 16, No. 2, 1989.*

[8] *Organization for Economic Cooperation and Development (OECD) and International Energy Agency (IEA). "Emissions Baselines, Estimating the Unknown." 2000.*

[9] *M.C. Trexler, D.J. Broekhoff, and L.H. Kosloff, "A Statistically-Driven Approach to Offsets-Based GHG Additionality Determinations: What Can We Learn?" Sustainable Development Law and Policy, Climate Law Special Edition 2006, Vol. VI, Issue 2.*



sources under the cap leaves fewer sources that might be candidates for offsets. For example, Waxman-Markey covers approximately 85 percent of total U.S. emissions. This includes energy-related emissions from the electric power, transportation, industrial, residential, and commercial sectors. Thus, none of the sources in these sectors would be eligible for offsets. In addition, to the extent that sources outside of the cap are regulated by other means, they would not be available for offsets. In the Waxman-Markey bill, landfill methane and coal bed methane emissions would ultimately be covered under the Clean Air Act through source-specific standards. With those two sources not eligible for offsets, EPA analysis of Waxman-Markey indicates that the majority of domestic offsets will come from domestic afforestation, forest management, utilization of animal waste methane, and other agricultural methane and nitrous oxide management strategies.

Agriculture and forestry sector offsets share many of the inherent challenges of offsets in other sectors, and raise several additional issues. The Bipartisan Policy Center's 21st Century Agriculture Project enumerated these challenges:[10]

- Lack of standardized, certified protocols for measuring, monitoring, and verifying soil carbon changes;
- Need for provisions to address the permanence of soil- or forestry-based carbon sinks given that biological sequestration can be reversed by natural disturbances (such as forest fires) or if mitigation practices (such as no-till farming) are abandoned;
- Lack of long-term experience with measuring, monitoring, and verifying emission reductions from agricultural projects and difficulty of establishing additionality in many cases. For instance, if mitigation measures are common practice in a given area or are deemed to represent "business as usual," demonstrating that they are additional would be difficult and controversial;
- Concern about "leakage" in the context of biological sequestration. For example, if one assumes that demand for products like timber is constant, reducing harvests or avoiding deforestation in one area could mean that production simply shifts to another area;
- The need to clarify ownership and legal issues for soil carbon credits tied to land resources that may change ownership or management over the life of the credit.

ISSUES SPECIFIC TO INTERNATIONAL OFFSETS: The potential for lower-cost emission reductions in developing countries is large, and including international offsets in a domestic U.S. climate program could substantially reduce costs.[11] Unfortunately, the same practical and theoretical challenges that apply to domestic offsets also apply—and are often more problematic—in the international context. A brief review of experience with the CDM program, which is the largest and most significant international offsets program to date, illustrates many of the difficulties.

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[10] *Bipartisan Policy Center's 21st Century Agriculture Project. "The Role of Agriculture in Reducing Greenhouse Gas Emissions: Recommendations for a National Cap-and-Trade Program." April 2008.*

Under the CDM, developed countries (or private sector entities from those countries) can invest in projects that reduce emissions in developing countries and receive credit for these reductions toward meeting their targets under the Kyoto Protocol. Because credits have monetary value in countries that have adopted mandatory programs (such as the EU's Emission Trading Scheme or ETS), they create a financial incentive for undertaking greenhouse gas reduction projects and introducing low-carbon technologies in developing countries.

The requirements and procedures for awarding CDM credits are complex. Projects must have approval from the host country and from the investing country, and developers must follow specific procedures for evaluating environmental and social impacts, including submitting a detailed project design document that identifies the emissions baseline, monitoring plan, and methodology to be used for calculating impacts. Projects are verified by accredited independent third parties, called designated operational entities, and credits are issued by the CDM's Executive Board only after a designated entity has verified that emission reductions have been calculated and monitored according to approved methodologies.

As of May 2009, after five years of operation, roughly 1,600 CDM projects had been registered, offsetting approximately 300 million tons of carbon dioxide annually.[12] An additional 2,900 projects have been proposed and are at various stages of approval.

Despite demanding project requirements and a lengthy review process, the CDM has drawn considerable criticism. By far the most common critique is that many claimed reductions would have occurred anyway; indeed, a number of studies have found that the extent of true additionality for a significant percentage of the reductions claimed is debatable."[13] The CDM has also been criticized for its expensive and time-consuming approval and crediting process, as evidenced by a substantial backlog of projects awaiting approval for registration. Critics charge that this is due to a cumbersome project-by-project approach to defining and approving baselines and establishing monitoring requirements, estimation methodologies, and additionality. This results in high transaction costs, increases investment risk for project developers, and strains the program's administrative capacities.

Observers of CDM have noted that, understandably, many of the early types of projects to receive credits have been those with the lowest costs and highest returns. Yet, the CDM has been less successful at channeling

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[11] *The potential supply of international offsets is considerably larger than the potential supply of domestic offsets, in part because domestic offsets would be limited to emission sources that are not included in the cap-and-trade program or otherwise regulated (whereas all sources could theoretically generate offsets in countries that have no mandatory greenhouse gas policy) and in part because offset opportunities related to forest preservation and land use are generally much larger in developing countries.*

[12] *All statistics in this section are from "UNEP Risoe CDM/JI Pipeline Analysis and Database. May 2009.*

[13] *See for example, Wara, M.W., Victor, D.G., 2008, A Realistic Policy on International Carbon Offsets, Working Paper 74, Stanford Program on Energy and Sustainable Development, Stanford University, Stanford, CA. Schneider, L., 2007. "Is the CDM fulfilling its environmental and sustainable development objectives? An evaluation of the CDM and options for improvement", Oko Institute, Report prepared for WWF, November, 2007.*

investment to projects that could transform energy use in key sectors. For example, a small number of projects involving gases with high global warming potential, such as hydrofluorocarbons and nitrous oxide, are responsible for a disproportionate share—more than 25 percent—of total CDM credits awarded. Meanwhile, potentially transformative technologies such as coal plants with carbon capture and storage are not eligible for CDM credits. Finally, critics have noted that most of the benefits of CDM have been garnered by only a few developing countries. Most notably, projects in China have been responsible for 37 percent of CDM credits issued thus far.

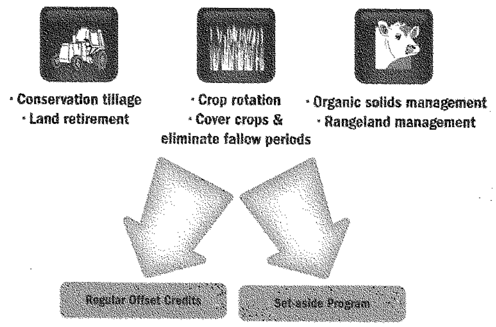
DESIGNING AN EFFECTIVE OFFSETS PROGRAM

STRIKING A BALANCE BETWEEN RIGOR AND COST: Any offsets program must balance the need for investor certainty, reasonable transaction costs, and administrative simplicity with assurance that offset projects have environmental integrity. One option for resolving this tension is to establish a tiered system whereby the types of offset projects that are most easily verified (both in terms of quantifying emission reductions and in terms of establishing additionality, permanence, etc.) could use a streamlined procedure when applying for credit. This top tier could include an initial "positive list" of categories of projects that would generally be considered eligible for credit (for example, animal waste methane use projects). Over time, additional categories could be added to the list through administrative rulemakings as experience grows with more complicated types of projects.

The use of standardized methods represents another option for reducing investor uncertainty and streamlining verification and approval processes. Under this approach, similar projects could be considered together rather than individually. Performance-based benchmarks could further standardize the calculation of project baselines and assessments of additionality. While such benchmarks could be data- and resource-intensive to develop, once in place they would greatly ease the analytical burden of assessing benefits from individual projects. Performance standards or other objective criteria could also serve as proxies for "pure" additionality and thereby minimize the need for case-by-case administrative decisions.

ADDRESSING ISSUES SPECIFIC TO DOMESTIC SOIL-BASED AGRICULTURAL OFFSETS: Dedicating—or "setting aside"—a percentage of allowances *from within the emissions cap or overall budget*

A HYBRID APPROACH FOR AGRICULTURAL SEQUESTRATION PRACTICES



A hybrid approach to domestic soil-based agricultural offsets could award regular offset credits to projects that are able to meet rigorous standards for measurement, additionality, and permanence. New and innovative sequestration activities may have difficulty meeting such performance standards, and would instead by eligible to participate in a set-aside program.

under a cap-and-trade program could allow the U.S. to essentially undertake a large-scale demonstration program to resolve some of the issues specific to awarding offset credits for carbon sequestration in agricultural soils, while both allaying concerns about program integrity and creating new economic opportunities in rural communities. A variation on this approach would be to have provisions for both regular offset credits and set-aside allowances for soil carbon sequestration. Regular offset credits would only be available for soil carbon projects that can meet rigorous standards for measurement, additionality, and permanence. Set-aside allowances that are taken from under the cap could reward projects that provide important carbon benefits, but that may have more difficulty meeting these tests–an example might be no-till practices undertaken before the cap-and-trade program goes into effect (so-called "early action" projects). A hybrid approach can respond effectively to the twin goals of maximizing environmental benefits and maximizing participation by the agricultural sector. A requisite for awarding set-aside credits would be careful monitoring and evaluation so as to determine benefits with more confidence and learn from the experience.

OPTIONS FOR AN IMPROVED INTERNATIONAL OFFSETS PROGRAM: Given the concerns that have emerged about the CDM, there has been ongoing discussion and debate about how to design an improved program, whether that involves reforming the CDM or creating an entirely new U.S. program. The solutions that have been proposed are often guided by competing views of the primary purpose of an international offsets program. According to one view, international offsets are primarily a cost-containment mechanism intended to access low-cost greenhouse gas abatement opportunities.

The competing view is that international offsets are primarily a tool for promoting broad developing country engagement in activities to reduce emissions and for helping poor countries transition to a less carbon-intensive path of

> “A HYBRID APPROACH CAN RESPOND EFFECTIVELY TO THE TWIN GOALS OF MAXIMIZING ENVIRONMENTAL BENEFITS AND MAXIMIZING PARTICIPATION BY THE AGRICULTURAL SECTOR.”

economic development.[14] Ultimately, the hope is that this would lead to more significant greenhouse gas reduction commitments. Adherents to this view are more concerned with accelerating overall progress toward low-carbon technologies and policies, rather than ensuring that every individual project is additional. Seen from this perspective, international offsets could generate substantial financial resources for economic development assistance, technology transfer, and forest conservation. If for example, all of the international offsets allowed under Waxman-Markey materialize, the total amount spent to purchase these offset credits would average roughly $16 billion per year from 2012 through 2030 according to EPA's analysis.[15]

In line with this approach, a number of proposals have been advanced that would provide offset credits for activities or technologies implemented across an entire sector–most likely a high-priority sector, such as energy production and energy-intensive industry. This type of "sectoral CDM" approach has also been suggested as a possible option for supporting initiatives to reduce emissions from deforestation and forest degradation in developing countries.[16] In both cases, offsets could be calculated based on a national-level commitment to, for example, reduce rates of deforestation or emissions in a specific sector. Sectoral offset approaches have a number of potential benefits, including the ability to deliver offset credits (and financing) on a much larger scale. They could also facilitate a transition to sector-by-sector emission caps in developing countries.

On the other hand, sectoral approaches are not immune to some of the same challenges as project-based offsets. As with project-based offsets, it would be necessary to develop methodologies for establishing the business-as-usual baseline or counterfactual and to put in place effective monitoring, reporting, and verification protocols and processes. Moreover, a sectoral offset approach would likely require long and contentious negotiations with developing country governments to come to agreement on an approach that would cover an entire sector. Developing countries would need to have the institutional mechanisms and capacities to effectively set and enforce policies or regulations across entire sectors.[17] Finally, appropriate roles of government and private sector actors will need to be sorted out in any sectoral offset program. Because of all these uncertainties, we believe that the development of sector-based offset programs should not delay the early implementation of project-based programs.

Questions concerning the appropriate role of governments in an international offset market are also relevant to proposals that would have government entities involved in the procurement of offsets, particularly in the forestry sector.[18] Proponents of this approach argue that a government entity would have more buying power to negotiate prices closer to the actual cost of abatement (e.g., $5/ton) rather than closer to the allowance price (e.g., $20/ton). The benefit of this approach is that it might produce more offsets per dollar. Offset tons could then be resold to regulated entities at prices below the allowance market price. Alternatively, these emission reductions could be supplemental to the reductions achieved by a cap on U.S. emissions, such as in the forestry provision in Waxman-Markey discussed below.

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[14] *A.G. Keeler and A. Thompson, "Industrialized-Country Mitigation Policy and Resource Transfers to Developing Countries: Improving and Expanding Greenhouse Gas Offsets," Discussion Paper 08-05, Harvard Project on International Climate Agreements, Belfer Center for Science and International Affairs, Harvard Kennedy School, September 2008.*

[15] *Of course, capital outflows of this magnitude could also generate domestic political liabilities, as we have already noted.*

[16] *A wide range of activities are underway on this issue as part of the United Nations Framework Convention on Climate Change. These activities are generally referred to as "reducing emissions from deforestation in developing countries."*

[17] *Project Catalyst, "Towards a Global Climate Agreement, Synthesis Briefing Paper, ClimateWorks, June 2009.*

[18] *Purvis, et al., 2009.*

Although the idea that government could participate as a direct purchaser of forestry offsets is an innovative one, the Commission notes that it raises significant questions and uncertainties. For example, do government agencies have the resources and expertise to take on this role? Should Congress establish a new government entity for this purpose? How long will it take to negotiate agreements, and how would delays affect the domestic allowance market price? What sort of coordination will be required with other nations that may also wish to purchase forestry tons? Are there ways to structure this approach that would create a partnership between the public and private sectors? Despite these uncertainties, the Commission believes that a pilot program to explore the use of this mechanism to implement the supplemental forestry reduction provision in Waxman-Markey could be appropriate. The value of using this approach more broadly could then be evaluated during the five-year review process outlined below.

In our view, the U.S. approach to international offsets should emphasize both engaging developing countries *and* reducing the overall costs of a greenhouse gas program. U.S. policy should aim to build the capacity and institutions–both here and in developing countries–needed to support sectoral approaches while still guaranteeing that in the shorter term, project-based offsets can contribute to lower costs in a U.S. program. International offsets could play a critical role as part of a broader transition to level the playing field by inducing developing countries to take on stronger mitigation commitments. As part of this strategic approach, the United States should consider making access to our domestic greenhouse gas markets contingent on certain activities or levels of commitment by other countries.

Ultimately, U.S. policy concerning international offsets must be responsive to evolving discussions with key developed and developing countries. It should also recognize the benefits of a harmonized approach to setting standards for international offsets.[19] As such, it may be prudent for Congress to provide guidelines on how to develop an international offset plan and to allow the executive branch to review and possibly revise its approach to offsets periodically. For example, five years into the program, Congress could require a strategic review of international offsets that would consider issues such as:

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[19] *Note that support for harmonized standards should not be confused with accepting the rules of the CDM program in its current form.*

- Whether international offsets could be used to encourage fundamental changes in the energy systems of China and other key developing countries. This may include generating offsets from fewer but more significant projects (e.g., carbon capture and sequestration) or from broader sectoral initiatives.

- Whether the United States should utilize the CDM as the primary mechanism for international offsets or whether it should develop an independent program.

- Whether and how international offsets can be part of a strategic combination of incentives and sanctions that puts key developing countries on a pathway to adopting their own emissions targets.

- Whether the United States should condition access to its greenhouse gas market on benchmarks for developing country greenhouse gas commitments.

- Whether critical issues relating to monitoring and reporting for international offsets are being adequately addressed.

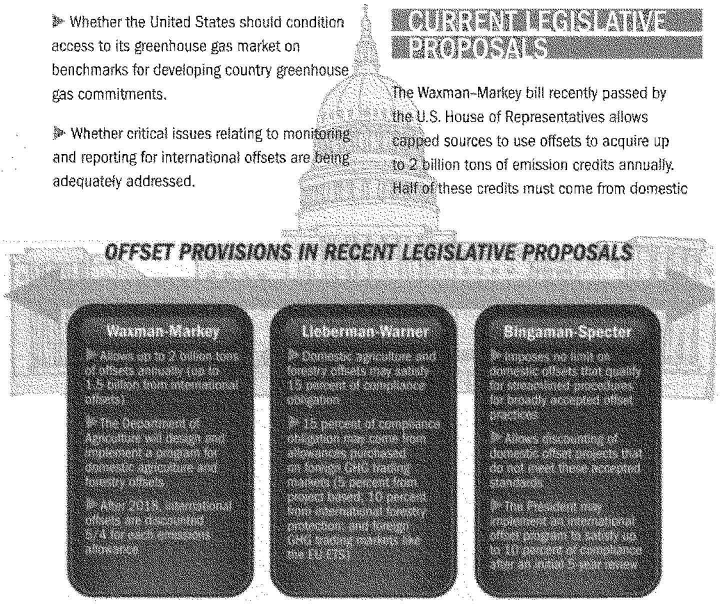
- Whether or how an international forestry set-aside—as included in Waxman-Markey and discussed later in this paper—could be transitioned to an offsets program. (Or, alternatively, whether both types of programs might co-exist by targeting activities in countries at different levels of development.)

- Whether there should be limits on the total number of international offsets allowed after the first decade of the program.

At the conclusion of this review, the President could authorize revisions to an international offsets program such that the program is consistent with evolving economic, policy, and diplomatic objectives.

CURRENT LEGISLATIVE PROPOSALS

The Waxman-Markey bill recently passed by the U.S. House of Representatives allows capped sources to use offsets to acquire up to 2 billion tons of emission credits annually. Half of these credits must come from domestic



OFFSET PROVISIONS IN RECENT LEGISLATIVE PROPOSALS

Waxman-Markey

- Allows up to 2 billion tons of offsets annually (up to 1.5 billion from international offsets)
- The Department of Agriculture will design and implement a program for domestic agriculture and forestry offsets
- After 2018, international offsets are discounted 5/4 for each emissions allowance

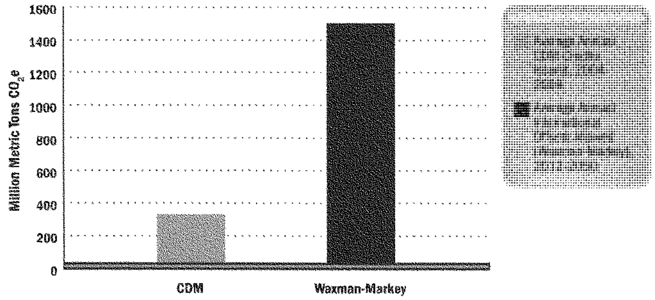
Lieberman-Warner

- Domestic agriculture and forestry offsets may satisfy 15 percent of compliance obligation
- 15 percent of compliance obligation may come from allowances purchased on foreign GHG trading markets (5 percent from project based; 10 percent from international forestry protection; and foreign GHG trading markets like the EU ETS)

Bingaman-Specter

- Imposes no limit on domestic offsets that qualify for streamlined procedures for broadly accepted offset practices
- Allows discounting of domestic offset projects that do not meet these accepted standards
- The President may implement an international offset program to satisfy up to 10 percent of compliance after an initial 5-year review

ACTUAL CDM CREDITS VS. ASSUMED INTERNATIONAL OFFSETS IN WAXMAN-MARKEY



sources, though if insufficient domestic offsets are available, up to 1.5 billion tons of emission credits can be obtained from international offsets. Starting in 2018, the bill requires capped sources to turn in 5 tons of international offsets to receive 4 tons of emission credits. The EPA would determine the list of eligible offset projects based on recommendations from an independent scientific panel. The bill would also allow for offsets based on reductions from sector-wide baselines and provides a variety of criteria that would guide the development of these types of offset activities. Finally, the bill has an allowance set-aside provision from 2012 through 2025 that allocates 5 percent of allowances to fund activities to prevent tropical deforestation and build capacity to generate international deforestation offsets in developing countries. The allowances allocated to this program are reduced to 3 percent from 2026 through 2030 and to 2 percent thereafter.

There are a number of uncertainties about how these offset provisions will work and how many offsets will be available. In the EPA analysis, regulated entities in the United States are projected to purchase, on average, 1.1 billion metric tons of international offsets annually under the Waxman-Markey bill. By comparison, from its inception in 2004 through May 2009, the CDM has registered projects that now yield a total of roughly 300 million metric tons of carbon dioxide-equivalent offset credits annually.[20]

Developing the administrative capacity to review and process the number of projects implied by these figures would be a challenge. Assuming an average project size of 100,000-150,000 tons per year, this would require the approval of 7,000-11,000 projects in the early years of the program.[21] This is several times the 1,600 projects that have been registered under the CDM since its inception.[22] In part because of concern about these administrative and practical challenges, the Waxman-Markey bill allows for sector-wide crediting for offsets. However, it will undoubtedly take some time to resolve the

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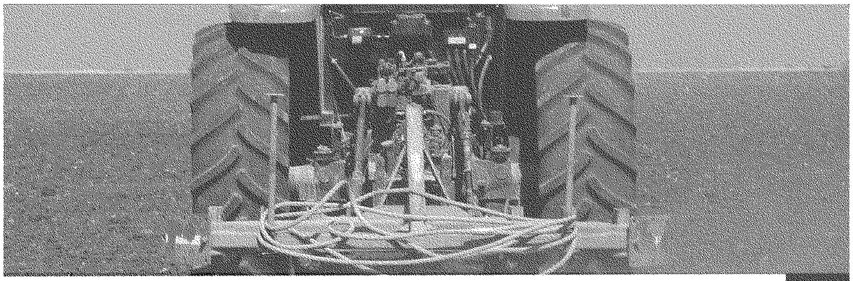
[20] *Clean Development Mechanism website http://cdm.unfccc.int/Statistics/index.html. Accessed June 4, 2009.*

[21] *Over time, there has been a decline in the average size of CDM projects. Projects registered before January 1, 2008 achieved annual reductions of roughly 210,000 tons of carbon dioxide per year, whereas projects registered after January 1, 2008 only realized reductions of approximately 150,000 tons per year.*

[22] *UNFCCC. Clean Development Mechanism. 2008 in Brief. http://unfccc.int/resource/docs/publications/08_cdm_in_brief.pdf.*



methodological, measurement, and political issues that must be settled to implement this approach, particularly since little practical experience exists with sectoral or policy- versus project-based offsets.

In contrast to Waxman-Markey, the Boxer-Lieberman-Warner Senate bill proposed to establish a percentage (rather than numeric) limit on offsets. As a result, maximum reliance on offsets under the proposal is more constrained, particularly in the early years of program implementation. Specifically, the Senate bill limited offset credits from domestic agricultural and forestry practices to 15 percent of submitted allowances, with up to another 15 percent of the overall compliance obligation coming from allowances purchased on foreign greenhouse gas trading markets (including up to 5 percent from project-based credits and up to 10 percent from international forest protection programs, with any demand not met by these two categories eligible to be met by purchases from foreign trading markets like the EU ETS). Another prominent Senate proposal in the previous Congress, Bingaman-Specter, proposed to limit international offsets to 10 percent of the overall compliance obligation.[23]

CONCLUSION

The economic benefits of offsets are clear. By substituting lower cost emission reductions outside of a domestic emissions cap for higher cost reductions available under the cap, offsets can reduce the costs of a U.S. climate program. Offsets can also help fill the critical need for private sector financing of the large global investments that will be necessary to transition rapidly growing economies to lower carbon energy systems.

On the other hand, offsets raise a variety of policy, political, and implementation issues that cannot be ignored and that will contribute to significant uncertainty about their availability and impact on program costs. For this reason, the Commission does not believe that an offsets program is adequate, by itself, to effectively manage economic risks in the early years of a U.S. cap-and-trade program. An additional cost containment mechanism, such as a price cap or an allowance auction reserve should be available to manage these risks and limit the potential for extreme price volatility during the critical startup period of a U.S. program. Over, time, we would expect offsets to play a larger role as implementation and policy issues are resolved.

The Commission believes that international offsets should be used to engage developing countries in greenhouse gas reduction activities as a bridge to more serious reduction

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[23] *Bingaman-Specter does not impose a numeric or percentage limit on domestic offsets. Rather it provides for a streamlined process to credit offsets that meet broadly accepted standards. Offset projects that do not meet the accepted standards could receive credit on a less than ton-for-ton basis.*

> “THE COMMISSION BELIEVES THAT PROPOSALS TO RECOGNIZE AND REWARD EMISSION REDUCTIONS AT THE SECTORAL LEVEL FOR INTERNATIONAL OFFSETS ARE PROMISING AND SHOULD BE ENCOURAGED.”

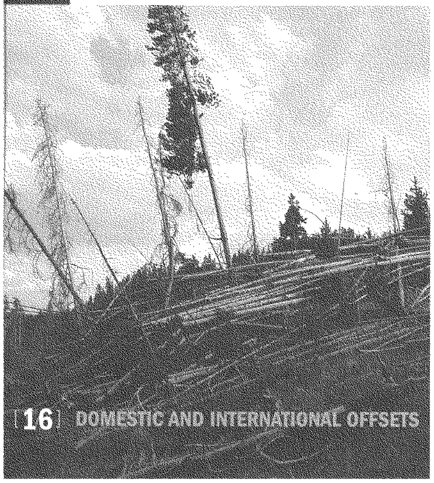
commitments. As a cost-reducing measure and as part of a package of incentives for greater participation by key trading partners, international offsets can help address the competitiveness concerns of energy-intensive U.S. industries.

Overall, the Commission believes that there should be some experimentation in the early years with institutions and mechanisms to manage offsets in ways that satisfy the need for careful evaluation. For example, the Commission believes that proposals to recognize and reward emission reductions at the sectoral level, while not a panacea, are promising and should be encouraged. This approach would provide the scale and focus necessary to make a significant impact on technology development in developing countries. Sectoral approaches for offsets may be particularly valuable if institutional, baseline, and measurement issues can be resolved.

In the shorter term, using allowances from within the cap to fund forestry measures in developing countries could achieve very substantial environmental benefits and could provide valuable experience concerning related measurement and administration challenges. We have also noted in our recent cost containment paper that the government could purchase forestry offsets with proceeds from the strategic auction reserve. These proceeds would be used to “pay back” the allowances borrowed from future years. Using a government agency as an “aggregator” for the supplemental forestry and strategic reserve provisions should be considered in the early years of an offset program. Ultimately, this new approach should be evaluated in the five-year review process outlined above and can be ramped up or phased out based on the initial results.

A variety of promising approaches should be explored and incorporated in a cap-and-trade program, in order to strike an appropriate balance between cost savings and environmental integrity and to maximize potential benefits from both domestic and international offsets. These include:

- A tiered approach to the qualifying requirements needed for different project types;
- Greater reliance on standardized protocols and measurement techniques; and
- A hybrid approach that combines a limited allowance set-aside with eligibility for regular offset credits to address the particular uncertainties inherent in soil-based carbon sequestration measures.



> “A VARIETY OF PROMISING APPROACHES CAN BE INCORPORATED IN A CAP-AND-TRADE PROGRAM TO MAXIMIZE POTENTIAL BENEFITS FROM BOTH DOMESTIC AND INTERNATIONAL OFFSETS.”

DOMESTIC AND INTERNATIONAL OFFSETS

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National Commission on Energy Policy

October 2009

Forging the Climate Consensus

Oversight of the Greenhouse Gas Market

Introduction

Cap-and-trade programs are designed to reach an emissions reduction target at the lowest possible cost. The trading mechanism associated with cap-and-trade provides companies with flexibility and limits costs to consumers. Previous environmental markets—such as those created to address SO_2 and NO_x emissions— have demonstrated the value of this approach. These programs have achieved lower-than-projected costs, spurred innovation, and produced verifiable environmental results. Despite this track record, recent failures in the regulation of the housing and credit markets and extreme volatility in energy markets have cast doubts on the transparency, integrity, and fairness of financial markets in general. These concerns, coupled with the potential magnitude of an economy-wide market for greenhouse gas (GHG) allowances, have led policymakers and stakeholders to seek assurances that a strong regime will oversee and regulate this brand new market.

Some stakeholders have called for significant constraints on fundamental design elements of an emissions trading program, such as limits on the ability of traders and other entities without a compliance obligation to participate in the market. Others have called for the elimination of all over-the-counter (OTC) trading of derivatives—that is a contract executed directly between parties, instead of over a regulated exchange—or at a minimum putting the transparency and regulation of this type of trading on the same level as exchange-based trading for other commodities. At the same time, in response to these and other proposals, market advocates have raised concerns that overly stringent regulation of a new GHG market could be counter-productive, leading to higher costs for consumers and businesses and undermining investment in cleaner technologies.

The Commission has concluded that a market for GHG emissions embodies all the benefits and potential pitfalls of financial markets in general. Thus, oversight of GHG markets should be addressed in the context of broader reforms governing commodity, credit, derivative, and other financial markets. An approach that regulates GHG markets the same way as similar commodity markets would be preferable to a piecemeal system that could undermine broader goals of regulatory consistency and transparency of financial markets. On the other hand, because of its political, economic, and environmental importance, the GHG market will likely face more scrutiny, certainly at the start, and should perhaps be subject to greater regulatory oversight. At the same time, there is a real concern that excessive regulation could curtail the efficiency of the allowance trading program, which is the reason for adopting a market-based approach to GHG regulation in the first place. In any event, Congress may adopt GHG legislation before more general financial oversight reforms are put in place—in which case consumers and other stakeholders will demand that concerns about market abuses be directly addressed in the legislation. If so, then the Commission recommends that *interim* oversight measures be adopted in order to build confidence in GHG markets and mitigate concerns that these new markets could be easily manipulated.

Key Points and Recommendations

Ultimately, the Commission believes that it is possible to maintain the benefits of a cap-and-trade program in terms of promoting innovation and cost savings, while minimizing opportunities for market manipulation and fraud. We have identified several specific program design elements that we believe are critical for striking this important balance:

- Rigorous oversight and disclosure requirements should apply to all aspects of the GHG allowance market, including derivative products. Consistent with this approach, there should be stringent penalties for abuses and there may need to be new mandates for position limits, clearing and margin requirements, reporting and disclosure, and other aspects of regulation. Ultimately, these elements should be made consistent with larger federal efforts to reform and regulate financial markets.

- It is difficult to impose the "right" amount of regulation and oversight for a new market before that market develops. There are simultaneously significant risks of failing to anticipate potential abuses and of undermining economically productive activities. We believe that broader architectural design features that allow the market to function but limit the potential for abuse are preferable when developing a new market. To the extent that climate legislation imposes specific restrictions on certain market activities, there should be authority to modify these restrictions based on credible evidence or evaluations as the GHG market develops and as broader market reforms are implemented.

- Many of the same design parameters that make for an effective GHG trading program also help prevent market abuses. These include clear rules for trading, transparent reporting of emissions data, rigorous verification and monitoring of emissions and offset reductions, clear and stringent penalties for violators, and equal access to the markets and information by all participants. Additionally, permitting regulated entities to bank and borrow allowances across compliance periods and including a well-crafted offset program will not only improve the cost-effectiveness of the program but will also increase the elasticity of allowance supply and demand and thereby reduce the risk of manipulation.

- Comprehensive market reforms will take some time to implement. In the meantime, a price collar would help counter concerns about market manipulation and excessive speculation. In its purest form, a price collar would be a simple price cap that is paired with a minimum price floor, both of which escalate in a pre-determined manner over time and phases out after an initial period. In our view, this is the single most transparent way to limit significant price volatility, whether caused by market speculation or other factors. As discussed in our previous paper "Managing Economic Risk in a Greenhouse Gas Program," a properly designed allowance reserve coupled with a price floor offers many of the benefits of a simple price cap and provides greater certainty about cumulative emissions reductions over the life of the program.

- Because spot and futures transactions in emission allowances will be conducted similarly, regulation should be consistent across the spot and futures markets. As such, it will also be efficient to rely on a single regulatory agency to oversee both markets. That agency should have clear jurisdiction over spot and futures transactions, along with the resources and personnel needed to adequately oversee all relevant markets. Moreover, because it is likely that markets for emissions allowances and derivative products will develop abroad, there will be a need to coordinate regulatory oversight with these venues to avoid circumvention of domestic regulations.

In the following sections, we provide a brief overview of how commodity markets are structured, outline concerns about market oversight and options to address these concerns, and summarize NCEP's recommendations in the context of the current legislative debate.

DESCRIPTIONS OF KEY MARKET-RELATED TERMS			
Over-the-Counter (OTC)	An OTC transaction is any contract executed directly between parties, as opposed to being mediated through a regulated exchange. OTC transactions offer the benefit of flexible terms that can be negotiated to meet the needs of the contracting parties.	**Futures / Forwards**	A future is a contract for future delivery of a particular asset. The price, length of maturity, and other terms vary widely among contracts. A futures contract does not usually result in physical delivery of the asset, but is instead satisfied by a payment based on the market price of the asset at the time of maturity. By contrast, a *forward* is a contract intended to result in future physical delivery.
Exchange	An exchange is a centralized trading floor in which assets are made available to multiple offerors simultaneously. To facilitate trading, products placed on exchanges usually feature standardized terms.	**Options**	A party to an option pays a fee for the right to purchase ("call") or sell ("put") an asset at a particular price at a future date. The price, date of maturity, and other terms vary widely among contracts.
Spot Trading	Also known as the "cash" market, spot trading involves an exchange of cash for immediate delivery of a particular asset. Spot trades in commodities, and forward contracts (defined in the right column of this table), are both excluded from Commodity Futures Trading Commission (CFTC) regulation.	**Swaps**	Swaps involve an exchange of value between two assets. An example of a GHG allowance swap is an agreement to trade the value of a Clean Development Mechanism (CDM) credit for an EU Emissions Trading System (ETS) credit at a specified date. Like futures, swaps are usually settled through payment rather than delivery.
Derivatives	Derivatives are financial contracts that gain or lose value as an underlying asset changes in price. Futures, options, and swaps are all examples of derivative contracts.	**Clearing Organizations**	Clearing organizations are financial institutions that stand as intermediaries between two parties to a contract, and assume the risk that one of the parties will default. These entities charge a fee for this service. Clearing is usually associated with exchange-traded assets, but can take place in OTC markets as well.

Background on Market Structures

The basic structures and institutions for GHG allowance trading are similar to those associated with other energy commodities. Commodities have "spot" or "cash" markets that allow actual physical quantities of the commodities to be traded. In the case of emission allowances, for example, a power company could make a purchase on the spot market to obtain the allowances needed to satisfy its current-year compliance obligation.

Commodities markets also use "derivatives," which are financial instruments such as futures and options contracts that are used to hedge the risk of future price fluctuations. Futures, options, and swaps are all examples of derivative contracts.[1] More generally, derivative contracts may be defined as financial instruments, linked to the price of an underlying commodity, that are used to hedge risk but do not result in a transfer of property.[2]

An important feature of GHG allowances is that they will exist solely as serial numbers in a government tracking system—in other words, an allowance is not a tangible item that must be physically transported and delivered from seller to buyer. As such, allowances can change hands many times; they are homogenous and, within a given compliance period, fully fungible (that is, any entity can use any valid allowance—regardless of origin—to meet its regulatory obligations within a given compliance period). This has several implications for future GHG markets. First, because of the ability to bank and borrow allowances, it means that there will likely be little difference, in practice, between physical and derivatives markets for GHG allowances. Second, it means that regulators will be in a better position to know who holds what allowances at all times than is the case in other commodity markets. A further implication is that allowances will in some ways bear a closer resemblance to financial products like stock options than to conventional commodities (like barrels of oil) that are more cumbersome to deliver and that embody extraction and storage costs. Finally, the timing of demand for allowances is shaped by a known compliance schedule (i.e., regulated entities are required to submit allowances at known intervals), though the ability to bank and borrow allowances across compliance periods, if permitted in the legislation, can of course modify this timing to a certain extent.

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[1] Commodity Futures Trading Commission. The CFTC Glossary: A Layman's Guide to the Language of the Futures Industry. July 2006.

[2] With respect to derivative products for GHG allowances, this definition needs additional clarification. Futures contracts require physical delivery unless they are offset prior to the delivery date. Although futures contracts for many commodities are frequently offset prior to physical delivery, many futures contract for GHG products will likely be delivered. For instance, according to the EU ETS Auction Consultation, the rates of physical delivery on EU ETS futures have been found to be higher than in other futures markets: "Up to now, the share of physical delivery in the European CO_2 futures market is significantly higher than in other derivatives markets, i.e. futures are not only used for hedging strategies, but as a means of buying or selling allowances." This is important for the GHG market debate because, as a result of this requirement, there will be little difference between a spot transaction and a transaction of a prompt month futures contract (i.e., one that provides for future delivery). It should also be noted that futures contracts will be an important mechanism to generate a forward curve price signal.

Other characteristics of the allowance market can be expected to more closely resemble ordinary commodities. As with many other commodities, the demand for GHG allowances and related derivatives is linked to trends in other markets. If, for example, the price of natural gas goes up relative to the costs of more CO_2-intensive fuels, the price of allowances will likely also rise as consumers shift to more polluting sources of energy, assuming there is a real time fuel switching capability. Because allowances (as well as offset credits) are freely interchangeable, at least within a single trading system, they also lend themselves to "traditional" transactional forms used in other commodities markets, such as forward contracts, futures, options, and swaps.

Overall, experience with existing SO_2 and NO_x markets in the United States and with the European Union's Emission Trading Scheme (EU ETS) indicates that GHG markets will be more similar than different in comparison to other commodity and financial markets. Furthermore, similar issues and concerns, in terms of the need for market reform and oversight, arise in the context of GHG markets as arise in financial markets more generally. These concerns are addressed in the following section.

Concerns About a New GHG Market

GHG allowance markets are potentially vulnerable to the same types of problems that can threaten any market — including fraud, price manipulation, "cornering," and insider trading. Concerns about market power and market manipulation were central, for instance, to the California electricity crisis, and some have blamed weak oversight of energy derivatives in part for the sharp escalation of oil and natural gas prices between 2005 and 2008.[3] Meanwhile, the recent financial system crisis has also focused attention on behaviors that contribute to systemic risk. The primary concerns that apply across nearly all financial markets are summarized below.

Market Manipulation: Market manipulation is generally defined as a deliberate attempt to create or maintain an artificial price for a commodity or security. To the extent that particular market players can exercise market power and exert undue influence on the price of a commodity, they can drive prices in emissions and energy markets higher (or lower) than competitive levels.[4] Moreover evidence of market manipulation might also shake public confidence in the cap-and-trade program itself, thereby damaging the credibility of a policy mechanism that will be critical to address climate change.

Excessive Speculation: There is continuing debate over the extent to which "excessive speculation" has driven up the costs of oil and other commodities in recent years. Although speculation in commodities has the potential to drive prices higher, it is also true that speculators can play important roles that help make markets more efficient and lower costs. This includes enhancing liquidity in a market by being ready buyers and sellers for other participants.

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[3] It should be noted, however, that other economists studying this issue disagree with this proposition.

[4] If prices don't actually accurately transmit the marginal cost of emissions abatement, there are real consequences for the effectiveness of the policy as a whole – the private sector could take on more costly emission reductions projects than are needed, or if the price is manipulated lower, it could discourage investments that should otherwise be economically desirable.

Systemic Risk: The recent financial crisis has focused attention on behaviors that contribute to "systemic risk." Systemic risk is the risk that behaviors could cause catastrophic failures that extend across markets and threaten large institutions. These behaviors could include "overleveraging" (excessive borrowing to finance risky investments), excessive speculation, and "herd mentalities" leading to asset bubbles and panics. However, in order to create systemic risk such behaviors must be indulged at a very large scale.

Market Design Issues

Before discussing options for more vigorous oversight of GHG markets, it is important to focus on several design elements of a cap-and-trade program that will have a direct impact on the resulting market's exposure to disruptions from price manipulation, fraud, and/or excessive speculation. Several design elements can minimize the risks of market manipulation within a GHG cap-and-trade program:

- Legislative and regulatory certainty, understandable rules, reliable consequences;
- Banking and borrowing across compliance periods;
- Rigorous monitoring and verification of emissions and offset reductions coupled with adequate enforcement resources and penalties for non compliance;
- Government allowance tracking;
- Timely, transparent, and equal public access to information on verified emissions, allowances, and offset projects; and
- An allowance auction design that encourages participation, competitive bidding, and equal access to information, while also minimizing the ability of market players to influence prices with collusion, market power, or an attempt to submit bids without an intention to execute.[5]

None of the design elements noted above are particularly controversial. Yet, there has been more significant debate about whether legislation should allow unlimited participation in GHG markets by traders and other investors. Indeed, some legislative proposals would restrict trading to entities with compliance obligations.[6] In general, however, markets with fewer entities are more vulnerable to the exercise of market power by individual participants. An overly constrained market would function less efficiently and therefore drive up overall costs. In addition, there is often no clear delineation between who is a covered entity and who is a trader. For example, banks that trade allowances may also own an equity stake in a power plant regulated under the program. Conversely, some power companies that own regulated entities have their own energy and allowance trading department, which may take speculative positions in some markets. Finally, it is important to emphasize that traders serve an important function in markets by providing the liquidity that allows compliance entities to hedge risk and manage the timing of capital expenditures. In fact, traders have been active participants in the successful SO_2 trading program, where they have filled this liquidity role.[7] Thus, the Commission believes that restricting participation makes a market more vulnerable to manipulation instead of less.

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[5] A full discussion of how the design of an auction can help prevent the manipulation of auction prices is beyond the scope of this paper. For a good treatment of these issues, see Holt, C., Shobe, W., Burtraw, D., Palmer, K., Goeree, J. (2007). Auction Design for Selling CO2 Emission Allowances Under the Regional Greenhouse Gas Initiative, Final Report.

[6] The Cap and Dividend Act of 2009 (H.R. 1862), introduced by Representative Van Hollen, authorizes trading only among GHG permit holders. Similarly, draft legislation circulated by Senator Cantwell under the title "Carbon Limits and Energy for America's Renewal Act of 2009" or CLEAR Act 2009, allows only covered entities to purchase GHG permits and prohibits the development of a secondary market for GHG permits.

Options for Ensuring Market Integrity

Although market misconduct around GHG financial products is possible, there is no reason to think it is more likely than in other financial markets. Moreover, these risks can be minimized through vigorous market oversight, clear and consistent regulatory safeguards, and good market design. GHG legislation passed in the House includes explicit market reforms and oversight authorities for GHG emission markets. In the Senate, Senators Dianne Feinstein (D-CA) and Olympia Snowe (R-ME) have introduced the "Carbon Market Oversight Act of 2009," which also provides specific oversight authorities for the new GHG market. Meanwhile, the Obama Administration has offered an across-the-board proposal to reform financial markets and related regulations. Included in the Administration's plan is a proposal to regulate derivatives contracts, including those for GHG allowances. Some of the restrictions and mechanisms that have been included in the Administration's overall proposal that would affect regulation of the GHG market are summarized below.

Venue Restrictions: In general, the trading of emission allowances and their derivatives on the secondary market may take place in three different types of venues, which have been defined in past regulations by the Commodity Futures Trading Commission (CFTC):

- Designated Contract Market (DCM): DCMs are formal exchanges such as the New York Mercantile Exchange (NYMEX). They are regulated by the CFTC and are subject to the most extensive regulatory oversight and requirements, including disclosure requirements for transactions, procedures for setting position limits, credit risk management tools such as margin requirements, and registration requirements for participants. These regulatory requirements impose a high degree of standardization and are intended to protect market participants from the default of counterparties and from manipulative behavior by other market participants. However, these benefits also add to the costs of trading on these exchanges.

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[7] Congressional Research Service. Air Pollution as a Commodity: Regulation of the Sulfur Dioxide Allowance Market 15 (CRS Report No. RL34235 2007). October 2007.

- Exempt Commercial Market (ECM): ECMs are electronic trading facilities that have traditionally been exempt from the highest level of CFTC regulation, which is reserved for DCMs. These markets, which are limited to larger players, provide lower transaction costs for market participants in exchange for higher transaction risk. However, in the aftermath of highly publicized abuses in the electricity and natural gas markets by Enron and Amaranth respectively, a March 2009 CFTC final rulemaking extended some of the reporting and position limit requirements formerly reserved for DCMs to ECMs.

- Over-the-counter (OTC): OTC transactions are discreet bilateral arrangements directly between two parties or facilitated by market intermediaries, such as brokers. Although the CFTC has some general anti-fraud provisions that apply to these markets, the Commission generally does not have a strong oversight role for OTC transactions and most OTC transactions are not reported to the CFTC.

As discussed below, several Congressional proposals would require all standardized derivative contracts associated with GHG allowances to trade on exchanges (DCMs). Some policy-makers have focused on exchanges because they promote two desirable goals. First, exchange transactions are more *transparent to regulators.* By requiring participants to transact in a limited number of identified venues, exchanges allow regulators to more easily examine the nature and extent of market activity; collect data from the exchange itself, or from individual traders; and monitor market failures or misconduct. By making such data available, exchanges also enable regulators to enforce regulations at lower cost. Second, exchanges make the market *transparent to participants* by developing standardized financial products and by promoting the rapid publication and dissemination of price information. In principle, a marketplace with well-informed participants should (1) operate more fairly by reducing opportunities for fraud or deceptive behavior and (2) operate more efficiently by allocating capital on the basis of current and complete data. Both of these factors, in turn, improve public confidence in the integrity of the market and encourage investment, thereby increasing the volume of transactions and the liquidity of the market as a whole.[8]

While exchanges offer clear benefits for many types of transactions, there is also a strong case for allowing some OTC trading to handle more customized types of trades. In existing emissions markets, there has been significant trading of customized contracts on OTC markets. For example, in the U.S. SO_2 trading program, coal contracts have been bundled with emissions allowances to assure that if sulfur content varied, the combination of coal and allowances would allow electric utilities to meet a compliance standard.[9] According to one observer, this type of flexibility has allowed a large utility in the Southeast to structure a coal contract that has helped keep a local coal mine in operation.[10] A variety of additional types of customized contracts could be envisioned for a GHG market. For example, an electric power company may find it useful to hedge risks by entering into contracts that protect against changes in relative prices (for example, electricity prices in a particular region or city as compared to allowance prices), or to use contracts that allow for the purchase (at a specified price) of a quantity of allowances that depends on local electricity demand. These examples illustrate that it is impossible to anticipate the entire set of customized contracts that might prove beneficial. Restricting market participants to using only standardized contracts could impede innovation in contract design and could impose additional costs on market participants. Additionally, another issue that arises with exchange trading is the cost of transacting trades.[11]

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[8] See Congressional Oversight Panel, Special Report on Regulatory Reform 13 (2009).

[9] Ellerman A.D., Joskow P., Schmalensee R., Montero J.P., Bailey E. *Markets for clean air, the US acid rain program.* Cambridge University Press, Cambridge. 2000.

[10] Gentry, C. and Media, A. Testimony before Senator Tom Carper and Senator Lamar Alexander."Roundtable: Is a three-pollutant bill needed?" April 23, 2009.

Advocates of maintaining OTC trading for GHG derivative markets also argue that the stringent capital requirements imposed by exchanges (see discussion below) could make financing difficult for some projects. For instance, the stream of offset credits earned by qualifying GHG-reduction projects is frequently used by project developers to attract needed equity investment. These agreements are, by necessity, highly tailored to the individual risks of the project and usually require intensive negotiations over the assignment of those risks. In addition, these agreements may involve a single project undertaken by a relatively small player—such as a farmer or forest owner—who would find it onerous to comply with the registration and reporting requirements that often accompany participation in exchanges. Thus, treating such customized or individualized contracts under which offset project investors get rights to future offset credits as regulated futures contracts could create a significant obstacle to, or even completely preclude, investment in certain offsets projects.

The Waxman–Markey bill would require exchange trading for all derivatives.[12] Feinstein–Snowe requires all trading of GHG allowances and standardized allowance derivatives to occur through "registered GHG trading facilities." Unlike the Waxman–Markey bill, Feinstein–Snowe permits some OTC and bi-lateral contracts if the CTFC determines that such contracts are unique, are not settled against the price of emission allowances or derivatives (that is, a contract isn't exchanged in reference to the emissions allowance price), and are not part of a large liquid market. In order for trades in these customized products to occur, each trade has to be cleared centrally or reported to the CTFC and included as part of the total GHG market risk exposure of the participant. Similarly, the Obama Administration proposal would not prohibit all customized OTC contracts. However, large OTC dealers and some other firms would be subject to regulatory requirements with regard to capital reserves, business conduct, reporting, and initial margins. All standardized OTC derivatives would be cleared through clearing organizations, which would also impose margin requirements.

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[11] It is worth elaborating on how the motivations for OTC trading differ for spot versus derivatives markets. In spot markets, the case for OTC trading is predominantly to help companies minimize their transaction costs, as what is being traded is always the same: allowances. For example, if a firm has a very large number of allowances to buy or sell, it would not want to expose itself to the market by placing orders on an exchange because such exposure could raise or lower prices against its trading position. Instead, a firm would rather do this in a way that does not move allowance prices against its trading position—such as by having a broker arrange a large block trade off-exchange (though reporting of the transaction immediately afterwards could still be required). In derivative markets, the benefits of OTC trading are primarily to allow a variety of instruments to be traded—even ones that are not amenable to being listed on an exchange where, unlike in the spot market, there is not just one instrument being traded. Furthermore, exchanges typically drop low-volume products because they are not profitable. If all trades in a specific product are required to be on exchanges and no exchange is willing to make a market, the effect is to essentially prohibit all trading. Exchanges don't trade otherwise standard stock options contracts that have distant expiration dates, for instance. In this case a firm would only be able to buy or sell them over the counter.

[12] Certain types of swap transactions may, however, be allowed under H.R 2454.

The Commission believes that customized derivatives can be valuable for hedging risks and increasing the overall efficiency of a GHG market. We support an approach that maintains the option of trading customized derivatives while ensuring that all derivatives have sufficient oversight and safeguards, and we view the proposals from Senators Feinstein and Snowe and the Obama Administration as constructive attempts to balance these goals.[13]

Reporting and Disclosure: Transparency is one of the most valuable tools for facilitating efficient and well functioning markets and for shedding light on disruptive market behaviors. Public access to aggregate market information (for example, concerning price, volume, and types of transactions) would facilitate price discovery, reduce opportunities for fraud, allow for greater oversight, and enable thorough analysis of market behaviors and price movements to discourage and/or uncover misconduct. Less clear is which data should be public and what should be considered confidential business information. Similarly, there is debate about which information should be automatically reported to oversight authorities and whether the costs of this reporting requirement for certain information are justified.

Assuming that all standardized contracts are required to be executed on an exchange that makes price and volume information public, questions remain about the treatment of customized contracts. For example, in the case of customized contracts that are executed outside a regulated exchange or regulated clearing organization, should all settled contracts or just those contracts that exceed a volume threshold and/or are transacted by large traders be made public? In addition to information about price, volume, time/date, and basic transaction type, which additional information, if any, should be made public about the terms of customized contracts? Should public data requirements be different for customized contracts when they involve spot allowances versus allowance derivatives? While there is debate about the risks and benefits of releasing detailed public data, there is good reason, based on systemic risk, for requiring that all data be reported to a regulator.

Requiring extensive contract details to be made public for each personalized agreement would most likely create a burden and raise concerns about business confidentiality for affected firms. However, a requirement to report price and volume information, without details on the type of transaction (for example, spot, option, forward, swap, etc.) would render reports less meaningful and harder to interpret. A balanced approach might include public reporting of basic transaction type, price, volume, and timing coupled with confidential full reporting requirements to regulators.

Some Congressional proposals incorporate these types of reporting and market information requirements. For example, the Feinstein–Snowe bill would require all trades of allowances and standardized derivates to create a "central limit order book" (CLOB) so that trades are recorded in real time with the CFTC. A CLOB is an electronic platform that facilitates buying and selling, provides price and other information to the public, and potentially allows regulators to collect transaction data and monitor market activity. [14] The Obama Administration's derivatives proposal would require all trades not cleared through clearing organizations to be reported to a regulated trade repository, which in turn would make data on individual entities' positions and trades available to regulators, and aggregate position and volume data available to the public.

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[13] However, unlike in Feinstein-Snowe, we believe spot trades should be allowed off the exchange subject to reporting requirements, akin to what exists with large block trades of NYSE listed stocks.

Margin Requirements: Commodity exchanges set "margin requirements" that essentially constitute the collateral that the holder of an option or futures contract must deposit to cover credit risk. Such margin requirements increase the capital required to engage in trading and reduce the risks that an over-leveraged firm could default on its obligation to a counter-party. Because of this capital requirement, margin restrictions increase the costs of trading and limit the positions held by some parties.

The Waxman– Markey bill charges Federal Energy Regulatory Commission (FERC) with promulgating margin requirements for allowances in the spot market. This would be a new role for FERC as its purview has generally not extended into market regulation of this nature. Because all derivatives would be trading on exchanges under the bill, margin requirements for these transactions would be set by the applicable exchanges. In the Senate, the Feinstein–Snowe bill would require the CFTC to promulgate regulations on margin requirements for individual market participants within one year. It is important for agencies promulgating margin requirements to examine not just cash-only margins but also other kinds of collateral, such as asset equity.

Clearing requirements: Clearinghouses ensure that both parties to a trade fulfill their contracts by assuming the financial risk if one of the parties defaults. Clearing organizations are owned by their members, who are collectively responsible for guaranteeing trades. Traders who are not members must have a member guarantee their trades. Given the possibility of extensive losses due to defaults, these organizations carefully monitor the credit quality of their members and impose margin requirements and position limits.[15,16]

Clearing is usually associated with exchanges, but can take place in OTC markets as well. Many customized derivative and spot contracts that are not amenable to a standardized exchange-traded product could be cleared through a regulated clearing organization. This offers many of the advantages of trading on an exchange in terms of mitigating the risk of default and providing transparency. However, there may be legitimate reasons why compliance entities and market participants that serve compliance entities would want to execute some allowance and derivative transactions outside of a regulated clearing organization. For example, some customized contracts may involve legitimate complexities that would make risk assessment by a regulated clearing facility difficult or costly.

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[14] See Monast, J., Anda, J. and Profeta, T. Nicholas Institute for Environmental Policy Solutions. U.S. Carbon Market Design: Regulating Emission Allowances as Financial Instruments. (2009.

[15] Harris, L. Trading and Exchanges, Market Microstructure for Practitioners. Oxford University Press, New York. 2003.

[16] Historically, clearing organizations are overseen and regulated by CFTC to ensure that they maintain adequate capital.

Regarding clearing requirements, Waxman–Markey would have FERC set standards for spot allowances that would be traded on exchanges. Because the Waxman–Markey bill requires exchange trading for all derivatives, clearing would also be required under existing CFTC authority. Feinstein–Snowe requires the CTFC to establish a new Carbon Clearing Organization, which is charged with creating a common clearing platform for regulated allowances. Under the Feinstein–Snowe proposal, private derivative clearing organizations could be designated as registered clearing organizations but would first have to be certified by the CFTC. Finally, under the Obama Administration proposal, all standardized OTC derivatives would be cleared through regulated central counterparties (CCPs).

Position Limits: Position limits are predetermined constraints on the size of a position held by a single entity for a specific type of commodity contract or option. The intent of these restrictions is to protect markets from excessive speculation that can cause unreasonable or unwarranted price fluctuations. In theory, large positions could be used to "corner" or "squeeze" an emissions market.[17] Emitters who have not accumulated the requisite number of allowances in advance of the calendar date on which emission rights must be surrendered may be particularly vulnerable to a corner or squeeze.

Most contracts involving commodities that must be physically delivered and many financial futures and option contracts regulated by the CFTC are subject to speculative position limits. For several markets (corn, oats, wheat, soybeans, soybean oil, soybean meal, and cotton), the limits are determined by the CFTC and set out in federal regulations. For other markets, the limits are determined by exchanges. The CFTC provides exemptions to position limits for "bona fide hedging" that is intended to limit risks to commercial enterprises that have large exposures as a result of their compliance obligations. The CTFC also sets rules for aggregating the positions of multiple traders that are subject to the same control. [18]

Although the rationale for position limits is clear, a number of questions must be addressed when setting these limits. For example, at what level should position limits be set and how should limits be aggregated across multiple venues? Position limits focused on a single venue (for example, the spot market) are not as useful as aggregate position limits that would incorporate the positions of large traders on each potential trading venue. Therefore, in addition to large-trader position limits for individual trading venues (such as already exist on exchanges), regulators may need to impose aggregate position limits that span trading venues to include multiple exchanges and the OTC markets, while potentially also covering the spot allowance, allowance derivatives, physical offsets, and offset derivatives markets.

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[17] Given the number of buyers and sellers in future GHG market and the difficulty of exercising significant market power, the occurrence of a corner or squeeze is unlikely.

[18] See http://www.cftc.gov/industryoversight/marketsurveillance/speculativelimits.html.

The Waxman–Markey bill charges FERC with promulgating position limits for allowances in the spot market. Because all derivatives would be traded on exchanges under the bill, position limits would be set by the applicable exchanges as is required under the Commodities Exchange Act. In the Senate, the Feinstein–Snowe bill would require the CFTC to promulgate regulations on position limits for individual market participants within one year.

Regulatory Jurisdiction: The distinctions between spot and derivatives markets for GHG products are less important than for some other commodities because what is referenced in a futures contract is exactly identical to what is traded in the spot market: an emission allowance. This attribute, coupled with opportunities to bank and/or borrow emissions allowances over compliance periods, makes GHG allowances and derivative products fungible.

Given the strong similarities between spot and futures transactions in emission allowances, regulation should be consistent across the spot and futures markets. If not, market participants are likely to quickly shift their activity to the market that presents a more favorable regulatory framework. If regulations are essentially identical across the spot and futures markets then it will also be efficient to rely on a single agency to regulate both markets. Another advantage of this approach is that a single regulator would presumably have greater capacity to aggregate information across all relevant markets and therefore would be able to monitor relevant data more broadly, instead of focusing on information solely within its limited jurisdiction. Important linkages between spot and derivative markets (and possibly other energy markets) could be missed if these two areas are assigned to different agencies. The Feinstein-Snowe bill takes this approach and gives all oversight authority for the GHG trading market to the CFTC. The bill would also establish a new department devoted exclusively to GHG markets issues. In contrast, the Waxman–Markey bill splits authority between FERC for spot markets and CFTC for derivative markets. In addition, it will be necessary to provide for some form of coordinated international oversight to ensure that U.S. regulation of GHG allowance markets does not simply encourage trading activities to move overseas.

Conclusion

The events of the past few years have shaken public confidence in the integrity and social benefits of financial markets. Policymakers are now seeking to impose greater oversight and restrictions on these markets to avoid a repeat of the damaging problems that have occurred in energy, housing, and other markets. GHG cap-and-trade legislation is being debated in this more cautious environment, and policy makers must convince the public that they are developing a market oversight regime for GHG trading that will rigorously protect consumer interests. As always, the difficulty is finding the right balance between "not enough" and "too much" regulation.

Clearly, past approaches that have allowed OTC trading and other segments of financial markets to operate with insufficient oversight have created large, unrecognized systemic risk. Notably, there have not been significant problems with OTC trading in SO_2 and NOx emissions markets in the United States or in the much larger GHG market in Europe. Nevertheless, recent experience in energy and other sectors shows that there must be no "dark corners" in a new GHG market, and all products and trading venues should be subject to strong and credible oversight by regulators. At the same time, while market misconduct has the potential to raise costs and undermine confidence in a market-based climate strategy, so too do overly burdensome trading restrictions and/or excessive reporting requirements that could impede the market's ability to manage risk, maximize the value of climate-related investments, and reduce the economic impact of reducing emissions on businesses and consumers. Thus, it is important to craft balanced provisions that will both provide reasonable protections and allow the market-based mechanism to achieve its goals and to ensure adequate oversight that can lead to modifications or revisions in the regulatory regime where they are warranted.

Given the level of Congressional attention and energy being devoted to reform of the financial sector, one may question whether climate change legislation should even include unique mechanisms for allowance market oversight. Such provisions could conflict with or duplicate whatever legislation emerges from the Congressional debate over financial sector reform more generally, leading to a redundant and confusing legal framework for GHG-related markets. On the other hand, simply leaving the regulation of GHG allowance markets to be addressed by broader reform efforts is not acceptable, especially since it is unlikely that current reform proposals would have applicability to spot allowance markets. In addition, overall reform of financial markets will take time to develop and implement and we acknowledge the need for public confidence in the integrity of a new GHG market from the start. To this end, interim solutions such as some of those discussed in this paper should be adopted that provide assurance that the market will not be subject to abuses. Climate legislation should provide the authority to modify features such as venue restrictions, position limits, margin requirements, and disclosure provisions to be consistent with both broader market reforms and evolving conditions in the new GHG market and to conform with overall financial market reforms when they are adopted.

Finally, the Commission believes the use of a price collar in the first decade of a climate program would be the most certain and transparent mechanism to limit volatility, whether caused by excessive speculation, changes in fuel markets, or extreme weather conditions. This type of mechanism could serve as an insurance policy, providing greater stability and predictability and building confidence in GHG markets among investors and the public alike while Congress develops a more comprehensive approach to reform and oversight.

The Members of the National Commission on Energy Policy are:

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John W. Rowe *Co-Chair,* Chairman and CEO, Exelon Corporation

Susan Tierney *Co-Chair,* Managing Principal, The Analysis Group; Former Assistant Secretary of Energy

Philip R. Sharp *Congressional Chair,* President, Resources for the Future; Former U.S. Representative, Indiana

Neil Z. Auerbach Founder and Managing Partner, Hudson Clean Energy Partners

Marilyn Brown Visiting Distinguished Scientist, Oak Ridge National Laboratory; Professor, School of Public Policy, Georgia Institute of Technology

John E. Bryson Emeritus Chairman, Edison International; Emeritus Chairman, Southern California Edison

Ralph Cavanagh Senior Attorney and Co-Director, Energy Program, Natural Resources Defense Council

Erroll B. Davis Jr. Chancellor, the University System of Georgia

Senator Rodney Ellis State Senator, Texas

Leo W. Gerard International President, United Steelworkers of America

Robert E. Grady Managing Partner, Carlyle Venture Partners, The Carlyle Group; Former Executive Associate Director, Office of Management and Budget

F. Henry Habicht Managing Partner, SAIL Venture Partners, LLC; Former Deputy Administrator, U.S. Environmental Agency

Newton B. Jones International President, The International Brotherhood of Boilermakers

Richard A. Meserve President, Carnegie Institution; Former Chairman, U.S. Nuclear Regulatory Commission

Mario Molina Professor, University of California, San Diego

Sharon L. Nelson Former Chair, Board of Directors, Consumers Union; Former Chief, Consumer Protection Division, Washington Attorney General's Office

Marvin E. Odum President and Upstream Americas Director, Shell Oil Company

Richard L. Schmalensee Howard W. Johnson Professor of Economics and Management and John C Head III Dean, Emeritus, Sloan School of Management, Massachusetts Institute of Technology

Norm Szydlowski Former President and Chief Executive Officer of Colonial Pipeline

R. James Woolsey Vice President, Booz Allen, Hamilton; former Director of Central Intelligence

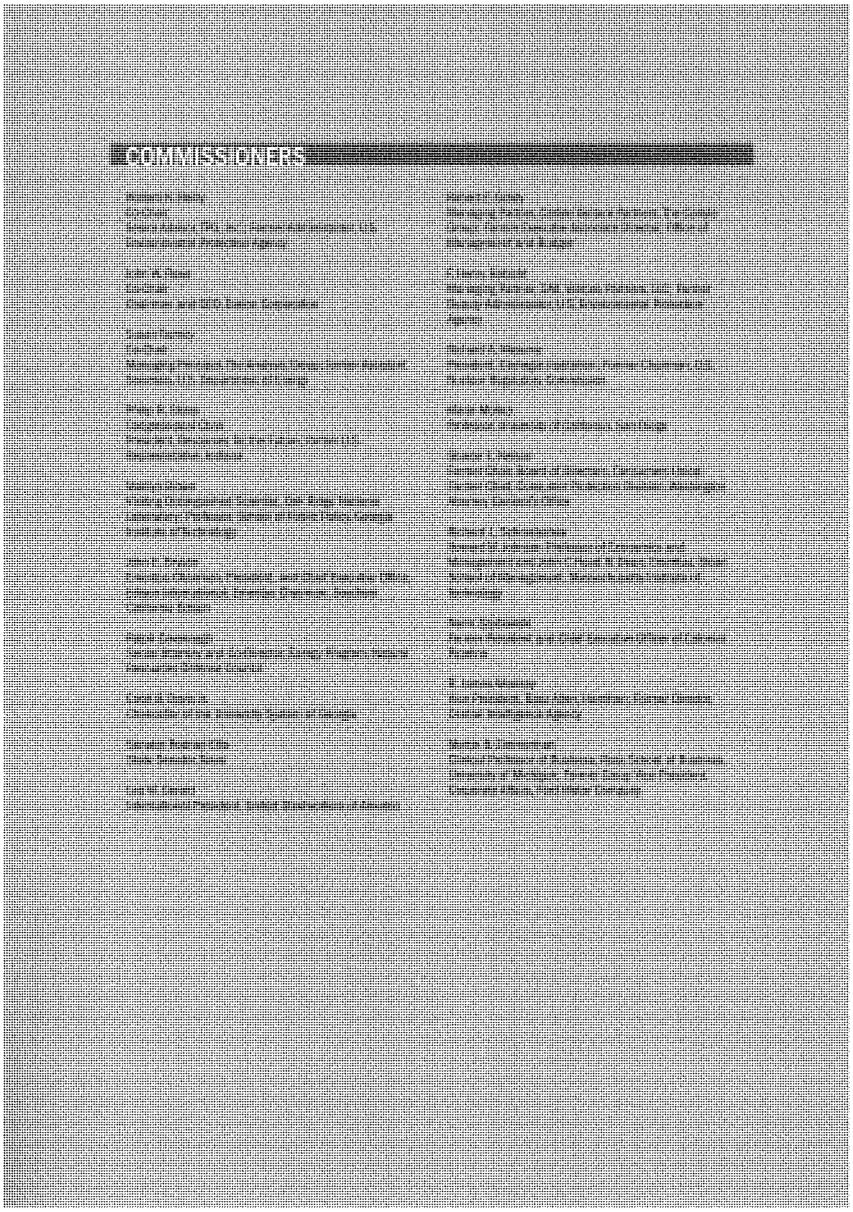
Martin B. Zimmerman Clinical Professor of Business, Ross School of Business, University of Michigan; Former Group Vice President, Corporate Affairs, Ford Motor Company

Jason Grumet Founder and President of the Bipartisan Policy Center; Executive Director of the National Commission on Energy Policy

National
Commission
on Energy
Policy

THE CASE FOR ACTION

FORGING THE CLIMATE CONSENSUS



COMMISSIONERS

Seventeen years after Rio and nearly a full decade into a new century the world is out of excuses and ***out of time***.

This Congress, not the next Congress or the one after that, must have the debate, ***make the tough choices***, and cut the deal that will finally begin to ***unleash*** American ***ingenuity and enterprise.***

> “WHILE AMERICA CANNOT SOLVE THE CLIMATE PROBLEM ALONE, IT HAS BECOME PAINFULLY EVIDENT THAT THE WORLD WILL NOT ACT ABSENT CREDIBLE U.S. LEADERSHIP ON THIS ISSUE.”

THE IMPETUS TO ACT

Seventeen years have passed since President George H.W. Bush traveled to Rio de Janeiro and joined other world leaders in pledging to stabilize greenhouse gas concentrations in the atmosphere “at a level that would prevent dangerous anthropogenic interference with the climate system.” In that time, U.S. emissions have increased nearly 14%[1] and global emissions have increased nearly 36%.[2] Developing country emissions, in particular, have shot up more dramatically than anyone could have predicted in the early 1990s—China's emissions alone have more than doubled since 1990 and now exceed total U.S. emissions.[3]

Clearly, the world has fallen far short in living up to the commitments made at Rio in 1992, and just as clearly a new global effort—one that fully engages the United States and major developing countries—is needed. For while everyone recognizes that America cannot solve the climate problem alone, it has also become painfully evident from the lack of progress over the last decade or more that the world will not act absent credible U.S. leadership on this issue. Simply put, international efforts will not succeed unless and until the nation with the greatest economic and technological resources—as well as one of the world's highest levels of per capita emissions—acts to limit its own contribution to global warming.

Continued inaction by the United States not only has global consequences, it is costly because it means that the emission cuts needed over the next few decades to avoid dangerous levels of warming must be that much deeper. In recent testimony before Congress, Dr. R.K. Pachauri, Chairman of the Intergovernmental Panel on Climate Change (IPCC), noted that evidence for warming of the climate system is now “unequivocal” and warned that “[d]elayed emission reductions significantly constrain the opportunities to achieve lower stabilization levels and increase the risk of more severe climate change impacts.”[4] Already, experts warn that the more protective stabilization goals often discussed in recent years are moving rapidly out of reach. Moreover, the latest developments in climate science lend greater urgency to the case for action: Effects on natural systems are already being observed and recent findings concerning the potential scope and magnitude of damages from future warming are increasingly worrisome.

ACTION IS NEEDED THIS CONGRESS

In this context, efforts to move climate legislation in Congress—including, notably, the proposal introduced by Chairman Waxman and prior bills sponsored by Senators Warner and Lieberman,

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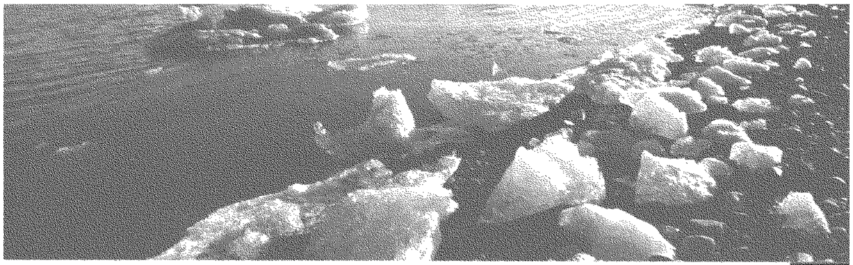
[1] *United States Environmental Protection Agency. 2007 Inventory of U.S. Greenhouse Gas Emissions and Sinks.*

[2] *Energy Information Administration. International Energy Annual 2006. International Carbon Dioxide Emissions from the Consumption of Energy.*

[3] *Energy Information Administration. International Energy Outlook 2008, World Carbon Dioxide Emissions by Region.*

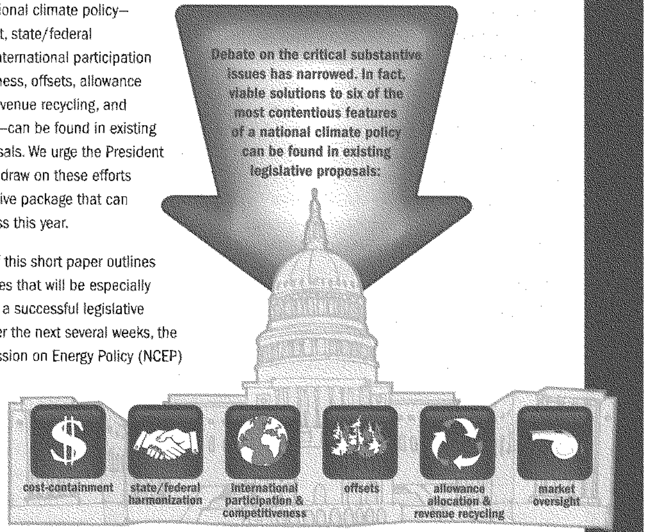
[4] *Testimony before the U.S. Senate Committee on Environment and Public Works, February 25, 2009. Citations from the IPCC Fourth Assessment Report, November 2007.*



as well as by Senators Bingaman and Specter—are to be applauded. Each of these initiatives reflects a serious and principled effort to find common ground on legislation that will achieve meaningful environmental results while addressing legitimate concerns about costs, regional and sectoral equity, and competitiveness that have blocked prior efforts to put together bipartisan support for action.

Fortunately, debate on the critical substantive issues has narrowed. In fact, viable solutions to six of the most contentious features of a national climate policy—cost-containment, state/federal harmonization, international participation and competitiveness, offsets, allowance allocation and revenue recycling, and market oversight—can be found in existing legislative proposals. We urge the President and Congress to draw on these efforts to craft a legislative package that can pass the Congress this year.

The remainder of this short paper outlines some of the issues that will be especially critical in forging a successful legislative compromise. Over the next several weeks, the National Commission on Energy Policy (NCEP) will release more detailed proposals that we believe can form the backbone of a robust and durable domestic climate policy. Many will surely disagree with some of the trade-offs we propose. Some will argue that it is not worth passing legislation if the resulting bill compromises short-term stringency or certainty about emission reductions; others will argue that whatever the long-term climate risks, further delay is appropriate in light of current economic conditions. ***We strongly disagree.***



Debate on the critical substantive issues has narrowed. In fact, viable solutions to six of the most contentious features of a national climate policy can be found in existing legislative proposals:

cost-containment
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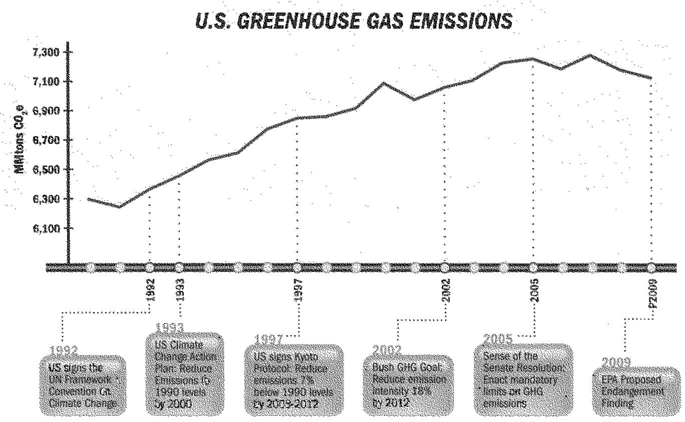
market oversight



Since 1990, net U.S. greenhouse gas emissions have increased 14%.[5] In the years since the U.S. signed the UN Framework Convention on Climate Change, there have been numerous voluntary initiatives to limit U.S. emissions. While these initiatives have likely contributed to slowed emissions growth, none have succeeded in achieving the necessary leveling and reduction of U.S. emissions.

Under a well-designed climate bill, emissions limits would be initially modest and ramp up in a gradual and predictable way over multiple years, with effective mechanisms in place from the outset to (a) guard against high or excessively volatile allowance prices and (b) protect low-income households and trade-sensitive, energy-intensive businesses. This approach will provide time and a favorable investment environment for robust low-carbon technology alternatives to become available, thereby reducing climate-related costs to the economy in the long run. It will also help ensure that the transition to a low-carbon economy provides a steady impetus for the creation of durable new industries and employment opportunities.

Most importantly, a successful bill will deliver clarity about U.S. climate policy and certainty about carbon costs going forward. This is *the* critical issue for businesses attempting to make strategic investments in new energy technology and long-lived infrastructure. It is also the central priority from the standpoint of engaging major developing countries in a re-invigorated international process. A clear signal concerning our nation's commitment to future greenhouse gas reduction efforts would greatly strengthen U.S. influence and leverage in international climate negotiations starting at the next United Nations conference in Copenhagen and beyond.

In sum, it has been the Commission's considered view for some time that the benefits of prudent but imperfect action profoundly outweigh the arguments for further delay. Increasingly, we are joined in that view by a diverse group of stakeholders that includes military experts, CEOs of major oil companies and electric utilities, labor leaders, state governments, religious leaders, sportsmen, and environmental advocates. All of these groups

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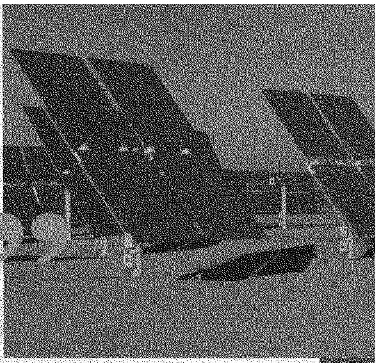
[5] *The United States Department of Energy. Energy Information Administration (EIA). Emissions of Greenhouse Gases Report. 2008. Note that data for 2007-2009 is an estimate as projected by the EIA.*

> “CLARITY ABOUT U.S. CLIMATE POLICY IS THE CRITICAL ISSUE FOR BUSINESSES ATTEMPTING TO MAKE STRATEGIC INVESTMENTS IN NEW ENERGY TECHNOLOGY AND LONG-LIVED INFRASTRUCTURE.”



recognize they will not get everything they want in national climate legislation. All of them also recognize that the intolerable (and probably far more costly) alternative to a clear federal policy is continued uncertainty, international paralysis, and reliance on highly imperfect regulatory mechanisms such as those triggered by EPA's recent finding that greenhouse gases endanger human health and welfare under the Clean Air Act. Seventeen years after Rio and nearly a full decade into a new century we are out of excuses and out of time. *This* Congress, not the next Congress or the one after that, must have the debate, make the tough choices, and cut the deal that will finally begin to unleash American ingenuity and enterprise on what is, by wide agreement, among the most difficult and consequential challenges we confront in our time.

KEY ISSUES FOR U.S. CLIMATE LEGISLATION

As noted above, we believe there are several key issues that must be resolved to reach agreement on national climate legislation in this Congress. The Commission will be releasing more detailed papers with specific recommendations and proposals for compromise on each of these issues in the coming weeks.

ALLOWANCE ALLOCATION AND REVENUE RECYCLING: Exactly who gets what share of the allocation pie is likely to remain very contentious, as the stakes are high—the potential allowance value created by an economy-wide program to limit U.S. greenhouse gas emissions is on the order of tens or even hundreds of billions of dollars per year. We continue to stress that while allocation affects the distribution of benefits and burdens among firms, industry sectors, and consumers (and thus can be used to address equity concerns) it does not affect the environmental results of a cap-and-trade program. With this in mind, NCEP believes that allocation must serve three essential purposes. First, allowance allocation should be used to protect households, especially low- and moderate-income households, from adverse economic impacts as a result of higher energy prices under a climate program.[6] Second, it must support energy-intensive industries in making a viable transition to a lower carbon footprint without resulting in the significant export of jobs and emissions to our trade competitors. Third, allowance value should be used to create incentives for increased investment in the research, development, and deployment efforts needed to advance critical no-and low-carbon technologies and for investment in needed adaptation measures.

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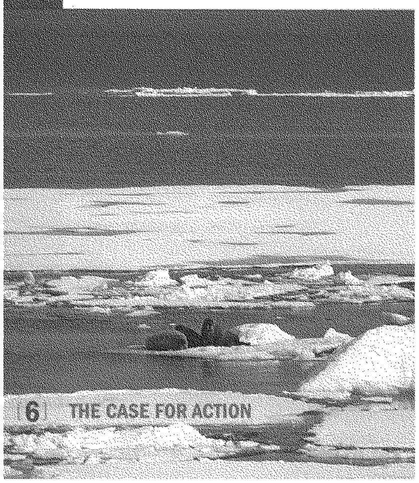
[6] *Note that protection for consumers should be de-linked from energy consumption, so that appropriate price signals for reducing demand and avoiding emissions are preserved. Mechanisms that achieve this objective include recycling allowance revenues through other programs, such as income tax credits.*

> “A PRICE FLOOR ALONG WITH A PRICE CEILING SHOULD BE CONSIDERED BECAUSE ALLOWANCE PRICES IN PAST MARKET-BASED REGULATORY PROGRAMS HAVE MORE OFTEN PROVED TO BE LOWER THAN EXPECTED, RATHER THAN HIGHER THAN EXPECTED.”

In pursuing these goals, we believe that Congress should strive for allocation designs that stress simplicity, clarity, and transparency and that avoid producing undesirable outcomes, such as windfall profits to certain firms or industry sectors, or perverse incentives. The approach we recommended in 2007 provides a reasonable basis for compromise and transition: One would start by allocating roughly half of the allowances for free to affected industry and consumers while the remaining half of the allowances would be auctioned. Over time, the quantity of allowances allocated for free would decline to allow for a gradual transition to a full auction. It is also possible to design an efficient and equitable approach that begins with a somewhat larger free allocation at the outset and transitions to a 100% auction more quickly. Recognizing that the revenue streams generated as an allowance auction expands over time will be significant, it is appropriate to begin exploring the fiscal implications and possible uses of these revenues. Many economists argue, for example, that the use of some auction revenues to reduce or offset other taxes could significantly improve the overall economic efficiency of the policy.



Allocation issues within the electric sector are particularly complex and have been the focus of recent discussions concerning this aspect of program design. Here the Commission generally supports an approach that has been endorsed by the U.S. Climate Action Partnership (US CAP),[7] a coalition of industry and environmental stakeholders. Under this proposal, the initial allocation to the power sector is close to the full level of allowances required to avoid disruptive price impacts during the early phases of program implementation. Within the electricity sector, competitive power generators not affiliated with a utility would receive a small portion of allowances that reflect their net incremental costs. The remaining allowances would be allocated to local distribution companies (LDCs) for the benefit of their customers. The Commission recommends completely phasing out free allocation to the electricity sector in roughly 10 years.

COST CONTAINMENT AND PRICE VOLATILITY: Concerns about adverse impacts on the larger economy have always been central to the debate over whether and how to limit greenhouse gas emissions. Adverse impacts could occur if the costs of achieving

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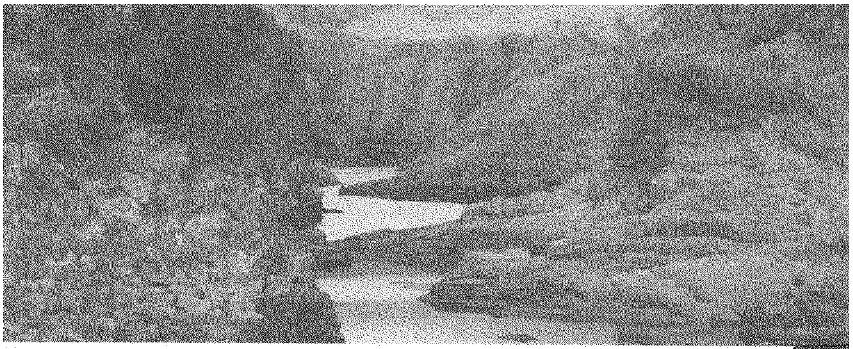
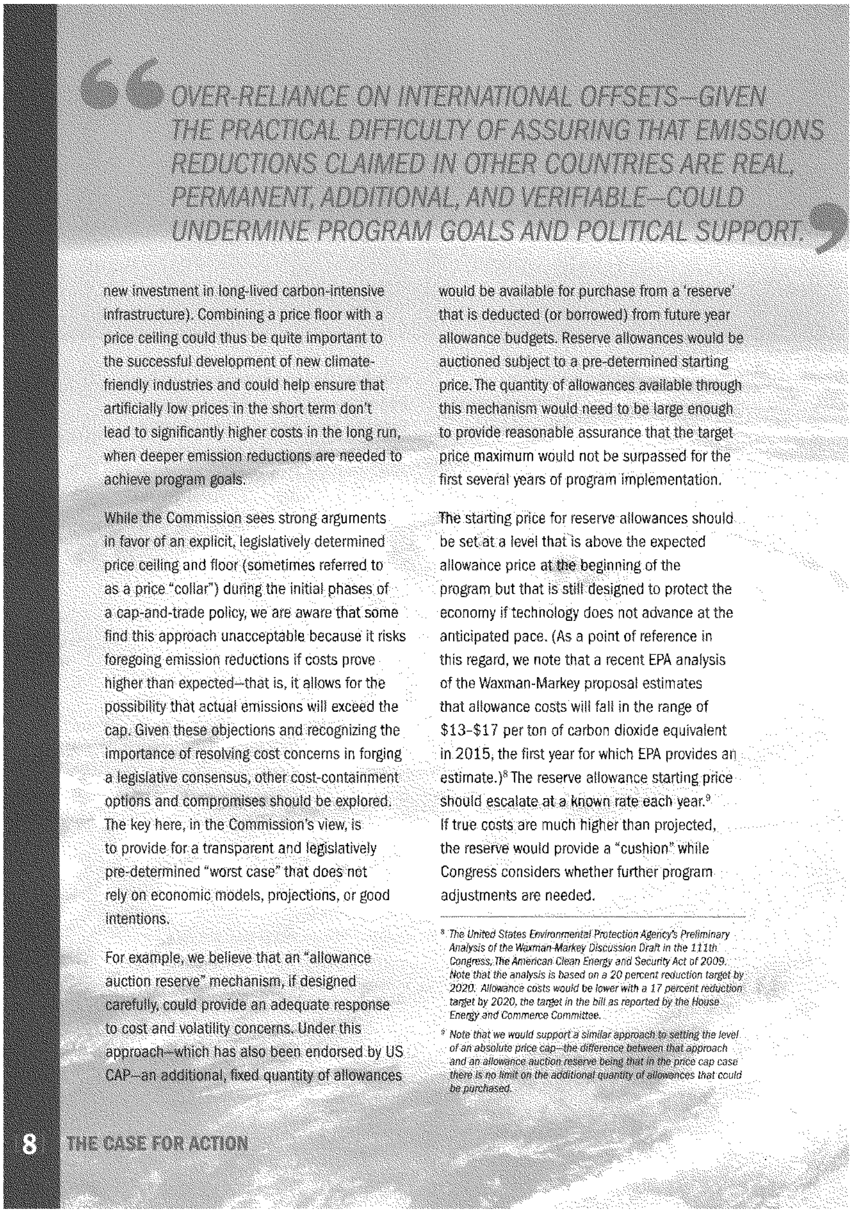
[7] *The proposal is available at www.us-cap.org.*



greenhouse gas reduction are much higher than expected; they could also occur if program costs on average are in line with expectations, but allowance prices are excessively volatile—that is, prone to sharp upward spikes as a result of unpredictable short-term factors such as weather. With respect to the first issue, disagreements about overall program cost have been difficult to reconcile because they are driven by different opinions about the anticipated rate of technological progress. Small differences in assumptions can lead to dramatic differences in predicted impacts and neither technology optimists nor technology pessimists can guarantee that their assumptions are right. The volatility concern is likewise important since excessive price fluctuations in carbon markets can erode confidence in the policy, prevent firms from planning effectively (potentially resulting in inefficient, subsequently stranded investment), and produce large, short-term impacts on consumers and businesses.

The Commission has recommended one option that effectively addresses both cost and price volatility concerns: a cap on the price of emissions allowances to ensure that the per-ton cost of emissions reductions required under the program cannot rise above a known level. We have argued that such a price cap should be phased out when actual mitigation costs are established through experience and significant progress has occurred at the international level. During the initial years of a climate program, when carbon markets and associated regulatory mechanisms are still developing, however, such a mechanism provides multiple benefits. Not only would a price cap protect consumers, businesses, and the economy as a whole in the event that abatement costs prove significantly higher than expected, it would also provide an effective safeguard against excessive speculation and price volatility in carbon markets.

Along with a cap on allowance prices at the high end, the Commission supports the concept of a floor or lower limit on allowance prices in case abatement costs prove significantly *lower* than expected. A price floor along with a price ceiling should be considered because allowance prices in past market-based regulatory programs have more often proved to be *lower* than expected, rather than higher than expected— in some cases because emissions budgets were inflated, in some cases because other factors (such as slower-than-expected economic growth) temporarily reduced demand for allowances. Some price stability at the low end, as well as at the high end, would assure that there are sufficient—and sufficiently consistent—incentives for investment in low-carbon technologies over time (along with sufficient *dis*incentives to



> OVER-RELIANCE ON INTERNATIONAL OFFSETS—GIVEN THE PRACTICAL DIFFICULTY OF ASSURING THAT EMISSIONS REDUCTIONS CLAIMED IN OTHER COUNTRIES ARE REAL, PERMANENT, ADDITIONAL, AND VERIFIABLE—COULD UNDERMINE PROGRAM GOALS AND POLITICAL SUPPORT.

new investment in long-lived carbon-intensive infrastructure). Combining a price floor with a price ceiling could thus be quite important to the successful development of new climate-friendly industries and could help ensure that artificially low prices in the short term don't lead to significantly higher costs in the long run, when deeper emission reductions are needed to achieve program goals.

While the Commission sees strong arguments in favor of an explicit, legislatively determined price ceiling and floor (sometimes referred to as a price "collar") during the initial phases of a cap-and-trade policy, we are aware that some find this approach unacceptable because it risks foregoing emission reductions if costs prove higher than expected—that is, it allows for the possibility that actual emissions will exceed the cap. Given these objections and recognizing the importance of resolving cost concerns in forging a legislative consensus, other cost-containment options and compromises should be explored. The key here, in the Commission's view, is to provide for a transparent and legislatively pre-determined "worst case" that does not rely on economic models, projections, or good intentions.

For example, we believe that an "allowance auction reserve" mechanism, if designed carefully, could provide an adequate response to cost and volatility concerns. Under this approach—which has also been endorsed by US CAP—an additional, fixed quantity of allowances would be available for purchase from a 'reserve' that is deducted (or borrowed) from future year allowance budgets. Reserve allowances would be auctioned subject to a pre-determined starting price. The quantity of allowances available through this mechanism would need to be large enough to provide reasonable assurance that the target price maximum would not be surpassed for the first several years of program implementation.

The starting price for reserve allowances should be set at a level that is above the expected allowance price at the beginning of the program but that is still designed to protect the economy if technology does not advance at the anticipated pace. (As a point of reference in this regard, we note that a recent EPA analysis of the Waxman-Markey proposal estimates that allowance costs will fall in the range of $13-$17 per ton of carbon dioxide equivalent in 2015, the first year for which EPA provides an estimate.)[8] The reserve allowance starting price should escalate at a known rate each year.[9] If true costs are much higher than projected, the reserve would provide a "cushion" while Congress considers whether further program adjustments are needed.

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[8] *The United States Environmental Protection Agency's Preliminary Analysis of the Waxman-Markey Discussion Draft in the 111th Congress, The American Clean Energy and Security Act of 2009. Note that the analysis is based on a 20 percent reduction target by 2020. Allowance costs would be lower with a 17 percent reduction target by 2020, the target in the bill as reported by the House Energy and Commerce Committee.*

[9] *Note that we would support a similar approach to setting the level of an absolute price cap—the difference between that approach and an allowance auction reserve being that in the price cap case there is no limit on the additional quantity of allowances that could be purchased.*

INTERNATIONAL PARTICIPATION AND U.S. COMPETITIVENESS:

Domestic efforts to limit greenhouse gas emissions are necessary but not sufficient. Action by other nations is essential—not only because the problem of climate change will inevitably require a global response, but because concern about adverse impacts on U.S. competitiveness will continue to arise as long as our major trading partners (including especially major developing countries) are not undertaking similar action to reduce emissions. Absent mitigating measures, a cap on domestic greenhouse gas emissions will not only increase costs to energy-intensive sectors, but could lead to the offshoring of domestic industry and jobs to nations with lax or non-existent climate policies, thereby worsening the effect of global warming. Successful climate legislation must address this concern. Fortunately, analysis of the potential competitiveness impacts of a greenhouse gas cap-and-trade program indicates that the additional costs of such a policy to energy-intensive sectors can be mitigated to a large extent - but not solely - through allocation measures and investment policies worth around 10%–15% of the overall allowance value generated by the program.[10]

Regarding the engagement of our major trade partners, the Commission strongly believes that a combination of carrots and sticks offers the most effective approach. Current legislative proposals provide positive inducements for participation by other nations (such as technology assistance). In addition, the United States must work with other countries to develop forceful and coordinated responses to international trade and competitiveness concerns if major emitting nations fail to adopt comparable climate policies over some reasonable timeframe.

OFFSETS: Emission offsets present another aspect of program design with implications for the cost of a cap-and-trade program. Depending on the offset provisions adopted as part of such a program, American companies could take advantage of low-cost emission reductions or carbon sequestration opportunities in the United States, and potentially in other countries. As an alternative compliance mechanism, domestic and international offsets would enhance regulatory flexibility and reduce program costs. The question is how large a role offsets can play without undermining the administrative feasibility and environmental integrity of the underlying program.

In particular, the Commission is concerned that over-reliance on international offsets— given the practical difficulty of assuring that emissions reductions claimed in other countries are real, permanent, additional, and verifiable—could

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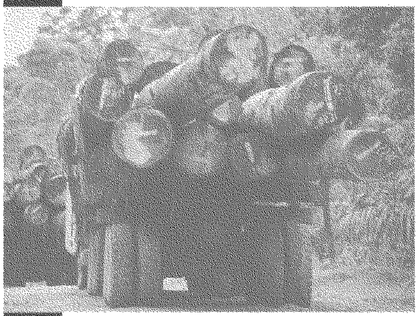
[10] *Note that Representatives Inslee and Doyle have introduced legislation that would allocate 15% of total allowances to energy-intensive industries such as iron and steel, pulp and paper, cement, rubber, basic chemicals, glass, industrial ceramics, and aluminum.*

"THE BEST RESPONSE TO THIS CONCERN IS TO ENCOURAGE STATE ACTIONS THAT ARE CONSISTENT WITH A NATIONAL PROGRAM BUT THAT AVOID CREATING OVERLAPPING CAP-AND-TRADE PROGRAMS."

undermine program goals and political support, especially if substantial U.S. funds are leaving the country to support abatement efforts abroad rather than at home. Moreover, we believe that the assumptions in some current proposals regarding the scope and timing of an international offsets program are unrealistic, particularly to the extent that such a program would require rigorous government review of numerous individual projects. For example, EPA's analysis of the Waxman-Markey proposal assumes that compliance would be achieved, in part, through the maximum use of international offsets. Based on provisions in the Waxman-Markey proposal, this implies the use of roughly 1 billion tons of offsets (in carbon-dioxide-equivalent terms) for regulated sources in the United States on an annual basis. Assuming that an average overseas project would generate 100,000 offset tons per year, this would require the approval of 10,000 projects within three years of the start of the program. To put the administrative burden in perspective, this is more than seven times the total number of projects registered under the Clean Development Mechanism (CDM) established by the United Nations as part of the Kyoto Protocol.[11]



In part because of concern about these administrative and practical challenges, there is growing interest in moving away from a project-by-project approach to emissions offsets in favor of an increased emphasis on sector-wide and standards-based reductions. Under this type of approach, offsets could be measured against a national-level commitment to, for example, reduce rates of deforestation or emissions in a specific sector. Even taking into account, however, that a sector- or standards-based approach could substantially expand the potential scope and scale of a manageable offsets program (while simultaneously reducing the need for project-by-project review), it will take some time to resolve the myriad methodological, measurement, and political issues that must be settled before these types of international offsets can play a significant role in providing additional compliance options under a domestic cap-and-trade program.

In sum, given the large administrative and environmental uncertainties that apply to international offsets, NCEP does not believe that an offsets program, by itself, can provide an adequate cost-containment mechanism. Long-term U.S. policy with respect to international offsets should be designed strategically to induce more significant developing-country commitments on greenhouse gases, rather

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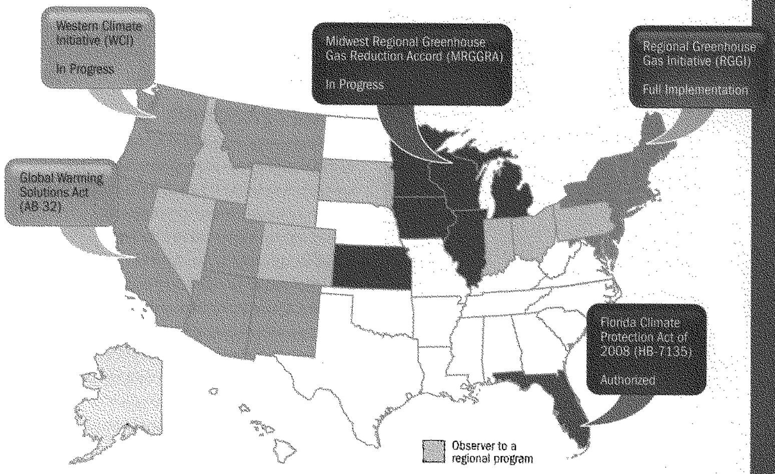
[11] *The United Nations Framework Convention on Climate Change. Clean Development Mechanism. CDM Statistics. A total of 1,329 projects were registered as of January 1, 2009.*

SELECTED STATE AND REGIONAL GREENHOUSE GAS INITIATIVES


Western Climate Initiative (WCI)
In Progress
Midwest Regional Greenhouse Gas Reduction Accord (MRGGRA)
In Progress
Regional Greenhouse Gas Initiative (RGGI)
Full Implementation
Global Warming Solutions Act (AB 32)
Florida Climate Protection Act of 2008 (HB-7135)
Authorized
▨ Observer to a regional program

than being solely viewed as a means to reduce compliance costs in the United States.

STATE/FEDERAL HARMONIZATION:

A number of states and regions have moved ahead of the federal government to adopt their own greenhouse gas reduction goals and regulatory requirements and some of them are concerned that a federal program could undermine their ability to pursue more ambitious targets. The Commission believes that it is critical to preserve states' ability to innovate and iterate in pursuing cost-effective climate solutions—indeed, as laboratories for democracy, state efforts in this arena may be critical to the long-term success of federal efforts. At the same time, there is a concern that state programs could undermine the efficiency of an eventual federal program by burdening industry with redundant and conflicting state requirements. The best response to this concern is to encourage state actions that are consistent with a national program but that avoid creating overlapping cap-and-trade programs with different currencies. The Commission believes a temporary moratorium on state and regional caps, as required in the Waxman-Markey bill, is a sensible way to proceed and will provide greater certainty to industry during the early years of a climate program. States should retain the authority to impose more stringent caps after the moratorium is over, but there should be restrictions on the quantities of federal allowances that states would be able to retire.[12]

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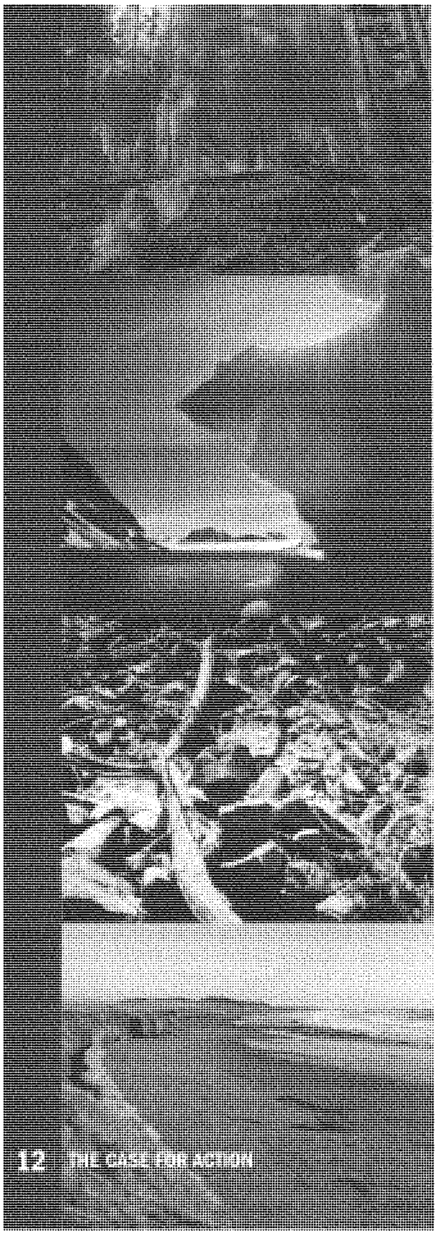
[12] *The rationale for such restrictions would be to address a concern that individual states, by pulling federal allowances out of circulation, could—in effect—impose more stringent emissions limits and higher costs on the citizens of other states. This concern is less applicable to the extent that allowances are retired on the basis of successful state efforts to reduce energy consumption or demand.*



Moreover, states should retain explicit authority to adopt more stringent building codes, auto efficiency standards, low-carbon fuel standards, and other programs.

MARKET OVERSIGHT: Doubts about the transparency, integrity, and fairness of financial markets are at an all-time high. These concerns have led to proposals for oversight of greenhouse gas allowance markets to protect against market manipulation and excessive speculation. The Commission agrees that there should be vigorous oversight of emerging allowance markets and that this will require new rules to govern reporting, disclosure, and other areas. Some of these concerns are specific to carbon markets and should be addressed in climate legislation. Other oversight issues should be addressed by Congress in the context of broader planned reforms of financial markets. We are concerned that legislative solutions that focus only on greenhouse gas markets may ignore important linkages to related energy markets. More generally, it is critical that the major features of any oversight program are consistent with an emerging consensus on the need to identify and reduce systemic risks. We recognize that it may take some time for Congress to revamp financial market reforms more generally and we would support interim measures to increase transparency in greenhouse gas markets. In addition, we strongly believe that a robust cost-containment mechanism for the initial years of a climate program can serve as an insurance policy to limit manipulation or excessive speculation while Congress develops a more comprehensive approach to market reform and oversight.

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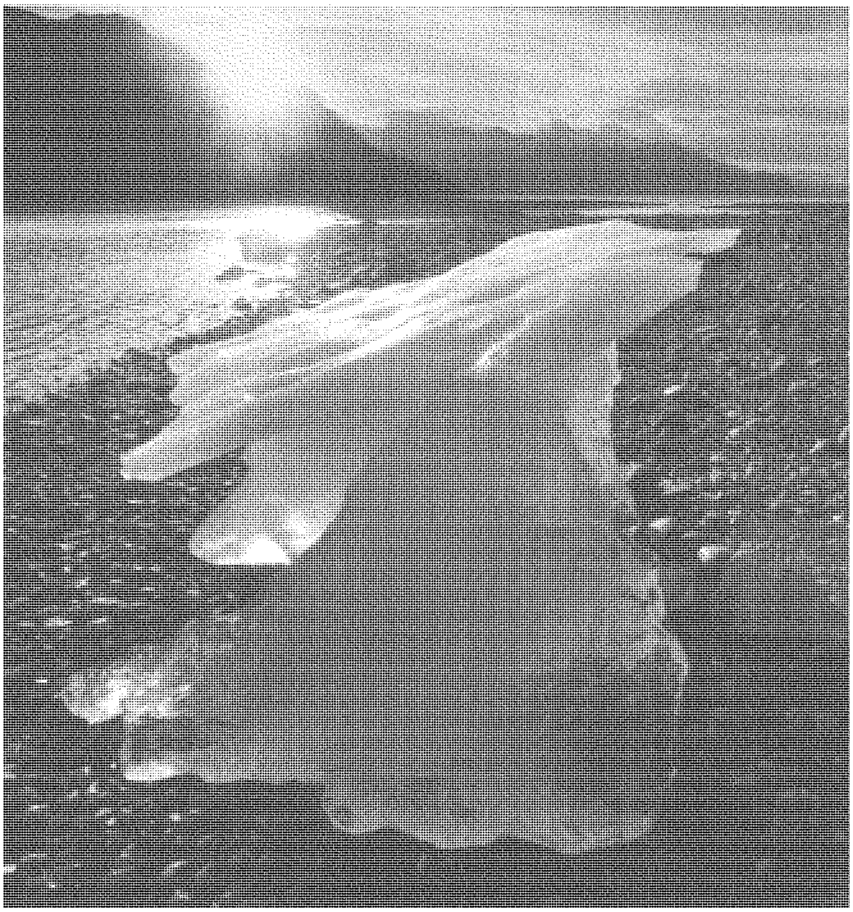
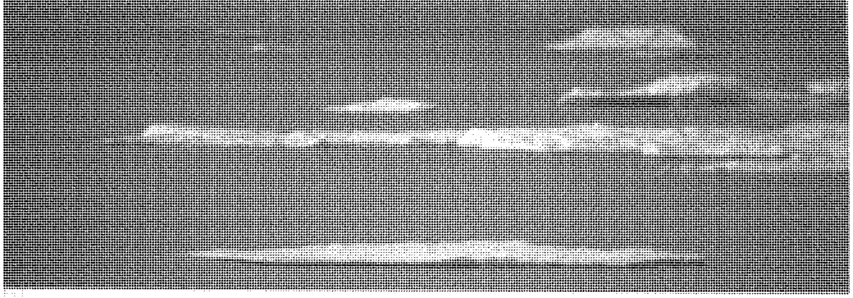


THE CASE FOR ACTION



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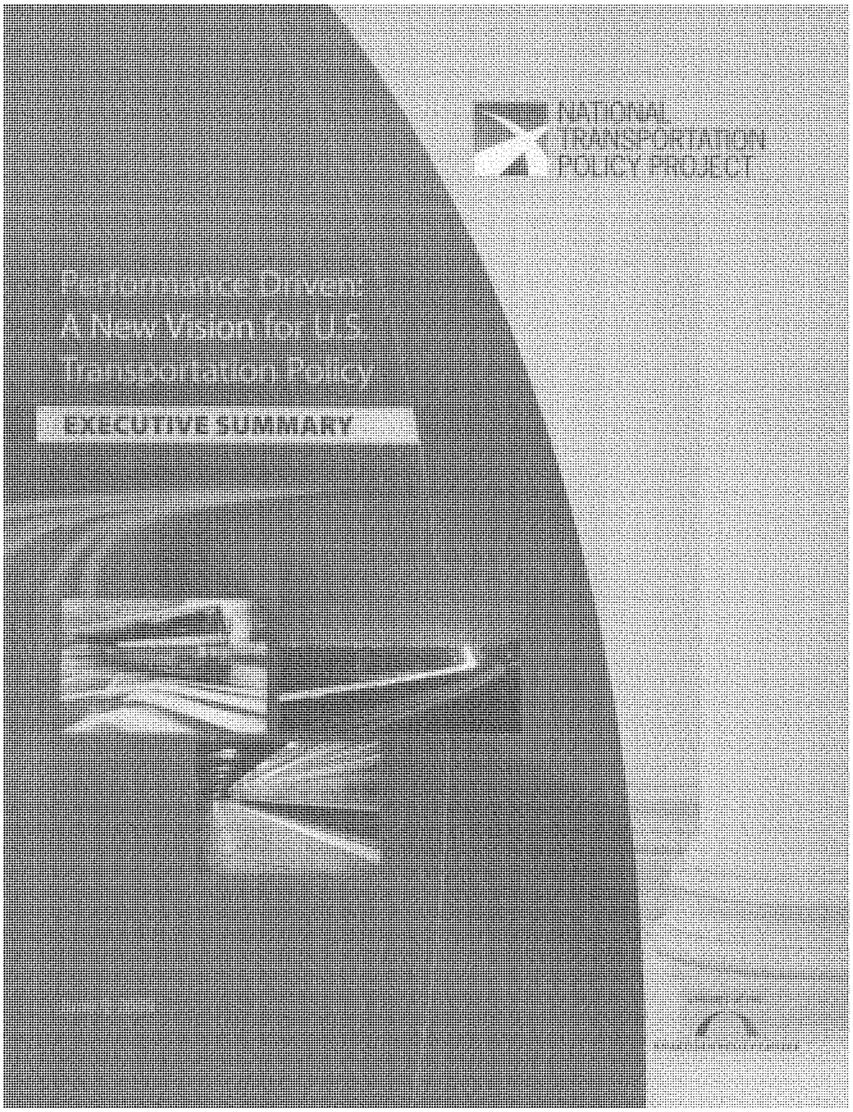
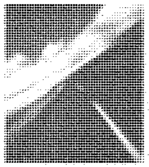


NATIONAL
TRANSPORTATION
POLICY PROJECT

Performance Driven:
A New Vision for U.S.
Transportation Policy

EXECUTIVE SUMMARY



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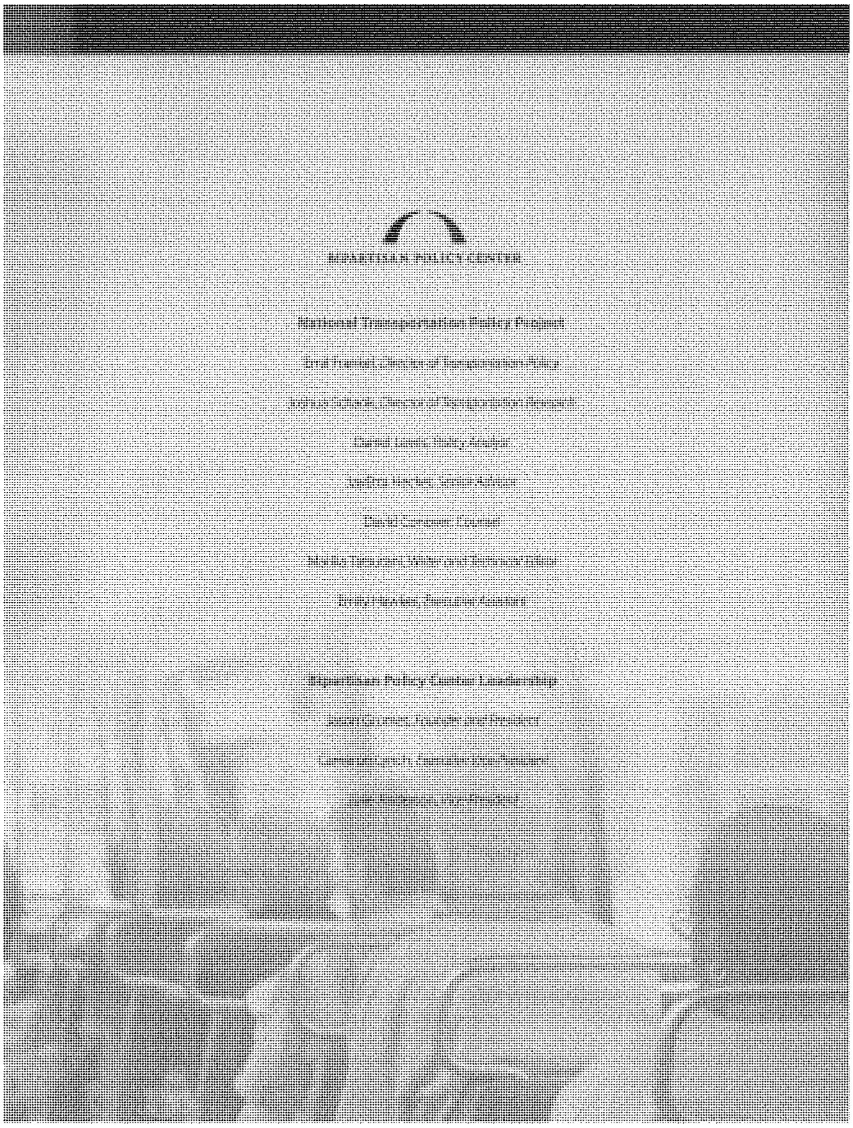

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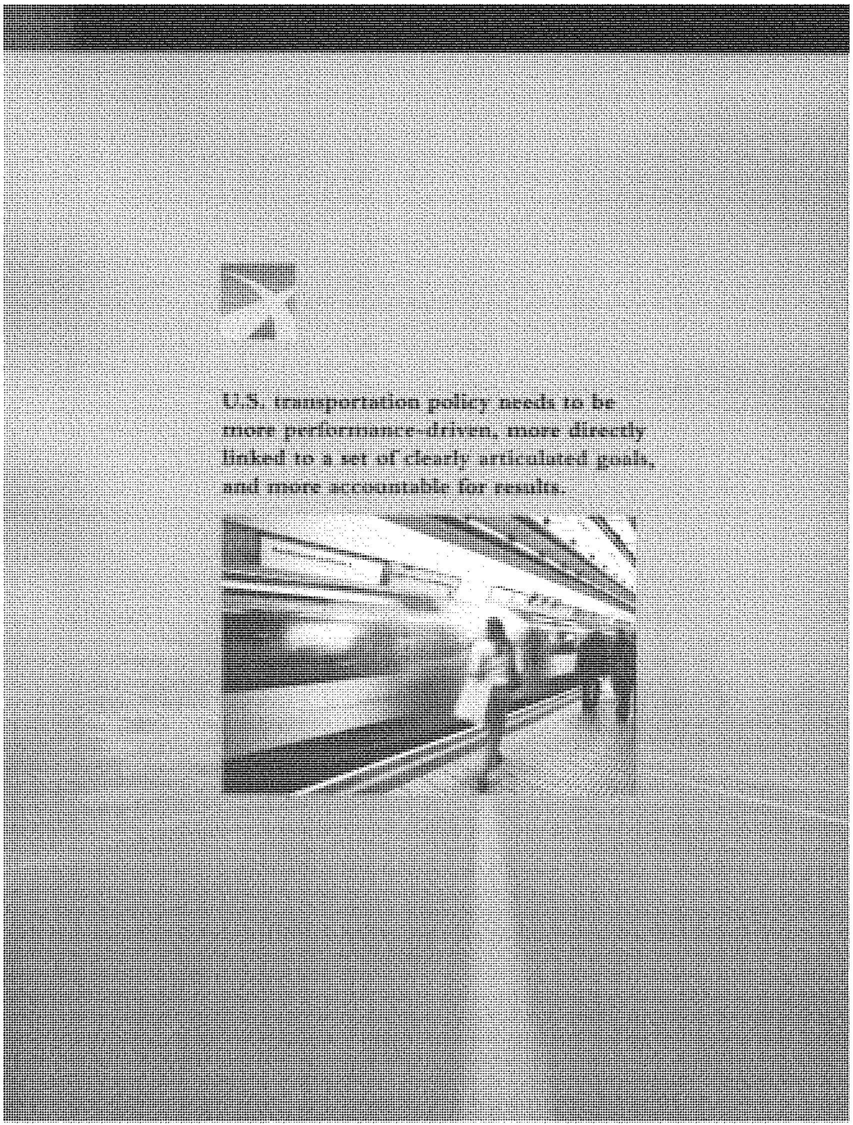
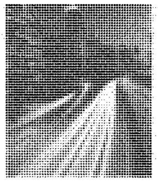


U.S. transportation policy needs to be more performance-driven, more directly linked to a set of clearly articulated goals, and more accountable for results.

Preamble

This report presents the findings of an intensive, two-year effort to develop multi-stakeholder consensus recommendations for a forward-looking American transportation policy. The NTPP's diverse membership includes experts and leaders in transportation policy, as well as users of the system whose voices have not typically been heard in previous policy debates. Collectively, Project participants represent a wide range of political, commercial, and stakeholder interests in the nation's transportation systems—and while some are well-versed in the intricacies of current programs and policies, the majority are not. The Project is chaired by four former elected officials who served at the federal, state, and local levels and have wide-ranging experience in public policy and management. Its aim has been to develop specific recommendations that are at once bold and pragmatic, sophisticated and understandable.

This report is the product of a bipartisan group of 26 members of diverse expertise and affiliations, addressing many complex and contentious topics. Arriving at a consensus document in these circumstances entailed multiple compromises. Accordingly, the reader should not assume that every member is entirely satisfied with every formulation in the report taken in isolation. Rather, we have reached consensus on the report and its recommendations ***as a package***, which taken as a whole offers a balanced and comprehensive approach to the economic, environmental and energy security, safety, and national connectivity challenges facing transportation policy-makers. The findings and recommendations expressed herein are solely those of the Project Members and do not necessarily represent the views or opinions of the Bipartisan Policy Center, its Advisory Board, or its Board of Directors.



Executive Summary

National transportation policy has lost direction and a clear sense of purpose, threatening substantial costs to our collective prosperity, security, environment, and quality of life. We are recommending bold and comprehensive reform founded on a relatively simple proposition: *U.S. transportation policy needs to be more performance-driven, more directly linked to a set of clearly articulated goals, and more accountable for results.*

This is a period of extraordinary opportunity for revitalizing America's surface transportation system. The investments of the interstate-highway era, begun more than 50 years ago, are nearing or beyond their intended lifespan. Existing systems are dated, in many cases strained to (or beyond) capacity, and increasingly fall short of delivering transportation services at the level of quality, performance, and efficiency the American public demands. Current funding mechanisms are not sufficient to maintain existing infrastructure, let alone provide the investments needed to expand and modernize our transportation systems. The broader fiscal outlook—notwithstanding a near-term burst of stimulus spending—suggests that public resources will be more constrained than ever in the years ahead. Meanwhile, available resources are typically distributed without any sense of national priorities, and there is little to no recognition of the link between transportation investments, energy, and climate. As Congress prepares to debate a new surface transportation authorization bill, there is growing support for fundamental reform of our nation's transportation policies. There is also a growing awareness that our approach to transportation must be responsive to a new set of 21st century challenges, from staying competitive in an increasingly globalized economy, to addressing urgent concerns about energy security and climate change.

> There is little to no recognition of the link between transportation investments, energy, and climate.

Recognizing the need for a new vision for federal transportation policy, the National Transportation Policy Project (NTPP) was launched in February, 2008, with the aim of bringing new approaches and fresh thinking to these issues.[1] Our aim has been to develop proposals for transportation reform that are at once bold enough to be effective, and pragmatic enough to be relevant. To that end, the Project has been explicitly bipartisan in its approach and in its membership from the outset. NTPP is chaired by four former elected officials—two Republicans and two Democrats—and brings together a group of individuals with a broad diversity of political views and professional experiences. This includes experts and leaders in transportation policy, as well as users of the system whose voices have not typically been heard in previous policy debates. A full list of NTPP members is at the beginning of this report.

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[1] The NTPP is a project of the Bipartisan Policy Center, which was founded by former Senate majority leaders Howard Baker, George Mitchell, Tom Daschle, and Bob Dole and builds on a model for principled bipartisan cooperation and compromise first pioneered by the National Commission on Energy Policy (NCEP). For more information on the BPC and on its other projects in the areas of energy, national security, science and policy, and health care please visit www.bipartisanpolicy.org.

Federal Goals

Two central questions have motivated and guided NTPP's analytical work and deliberations over the nearly two years since the Project was launched:

- ***Why and for what purposes should the federal government invest in transportation?***
- ***How can the federal government ensure that any greater investment be wiser investment that effectively advances national purposes?***

Clearly, the first step toward a more focused and effective federal role was to answer the first question: What are the federal government's primary goals for transportation policy and transportation system investments? In this report, NTPP proposes five key goals, all of which are critical to the national interest and all of which—because of their intrinsically national nature—require federal leadership and action:

- ***Economic Growth***—Producing maximum *economic growth* per dollar of investment
- ***National Connectivity***—*Connecting* people and goods across the nation with effective surface transportation
- ***Metropolitan Accessibility***—Providing efficient access to jobs, labor, and other activities throughout *metropolitan* areas
- ***Energy Security and Environmental Protection***—Integrating *energy* security and environmental protection objectives with transportation policies and programs
- ***Safety***—Improving *safety* by reducing the number of accidents, injuries, and fatalities associated with transportation

NTPP believes that this set of goals makes intuitive sense and would command broad support from the American public—and thus provides a strong foundation for a meaningful vision and fundamental reform. We are well aware that bringing about such reform will be much harder than identifying goals. Implementing a performance-driven approach and introducing accountability will challenge entrenched interests and require government institutions at all levels to change longstanding practices and ways of doing business. Accordingly, our discussions next turned to the difficult task of developing objective performance metrics that can be used to choose among different investment options and, subsequently, to judge their results.

There is no federal requirement to optimize "returns" on public investments, and current programs are not structured to reward positive outcomes, or even to document them.

Measuring Performance

Without clearly articulated goals, it is not surprising that there has been little accountability for the performance of most federal transportation programs and projects to date. The result has been an emphasis on revenue sharing and process, rather than on results. There is no federal requirement to optimize "returns" on public investments, and current programs are not structured to reward positive outcomes, or even to document them.

Table 1: Proposed Performance Measures

Economic Growth	Energy and Environment	Safety
Access to jobs and labor (metropolitan accessibility)	Petroleum consumption	Fatalities and injuries per capita
Access to non-work activities (metropolitan accessibility)	CO_2 emissions	Fatalities and injuries per Vehicle Miles Traveled (VMT)
Network utility (national connectivity)		
Corridor congestion (national connectivity)		

To remedy these deficiencies, it is not enough just to have goals—we also need a set of agreed-upon tools for objectively measuring how a given policy, program, or investment achieves progress toward those goals. Such tools, or performance metrics, must be fair, transparent, and free of bias toward particular transportation modes or geographic regions. Table 1 summarizes the performance metrics NTPP recommends for measuring performance with respect to each of the goals we identified at the outset (note that metropolitan accessibility and national connectivity are considered as components of economic growth).

Several further points bear emphasizing in a discussion of performance metrics. First, the metrics we have proposed, like the goals themselves, must be applied as a complete package, not in isolation. That means that any expenditure of federal funds should be targeted towards those investments that maximize benefits among all of these measures and minimize costs. Second, the specific metrics we have proposed represent only a starting point. They can and should evolve and improve over time to achieve better results, and to ensure that federal programs and policies remain fair and relevant. Finally, we recognize that substantial efforts will be needed in the area of data quality and data collection to support the rigorous and meaningful application of metrics, and to refine and update them periodically. However, the relative lack of useful data in transportation reflects the fact that we have never had a performance-based system requiring it.

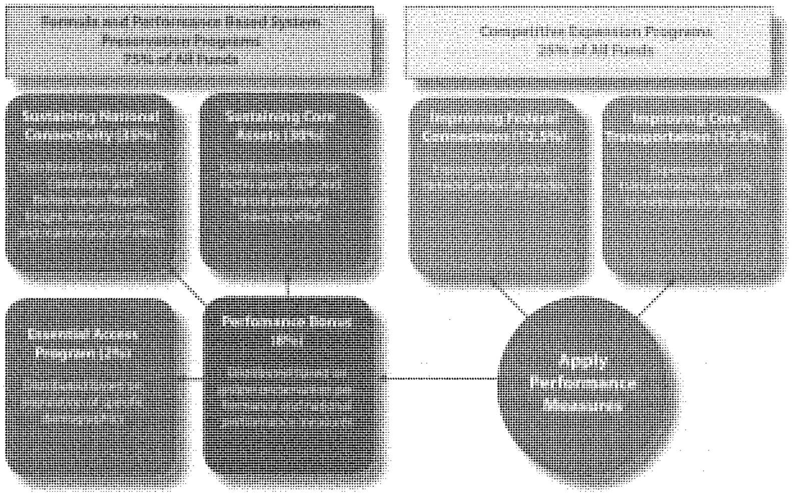
To achieve the recommended national goals and implement performance metrics, a comprehensive consolidation and restructuring of current programs—together with a fundamentally new approach to funding—are both required. These two urgent and perhaps more controversial issues are discussed in the next two sections of this summary.

Programmatic Structure

The last several surface transportation authorization bills have been marked by the rapid proliferation of federal transportation programs and by an increasing reliance on Congressional earmarks to direct federal transportation investments. Both are symptoms of the lack of focus and accountability we describe above. Addressing the root causes of these trends has become especially urgent in light of the longer-term fiscal realities that confront not only transportation programs, but all public investment. Despite the current surge of stimulus spending, the nation's collective resources are stretched thin and will be stretched much thinner for the foreseeable future. In this context, directing more resources to transportation through a set of existing policies and programs that are unsustainable, unfocused, and underperforming is not only unwise, it is untenable.

We recommend a new structure that consolidates all current federal transportation programs into two categories: formula-based **system preservation** programs and competitive **capacity expansion** programs. This consolidation is quite extensive—from approximately 108 programs to six—but is essential to focus the programs on performance. Under this new structure, the vast majority of funds would continue to be distributed via formulas—except that these formulas would distribute funds based on new criteria. Current formula distribution criteria provide perverse incentives to increase fuel consumption and carbon emissions, whereas the new criteria would provide funding based on need. All existing formula programs would be merged into three programs and restructured to align with national goals. A separate program would be created to reward good performance with respect to the use of formula funds. All other funding would be distributed through competitive grant programs that are programmatic, multimodal, and based on the ability of grantees to demonstrate progress toward defined national goals. The basic structure we are proposing is schematically illustrated in Figure 1.

Figure 1: Proposed Federal Funding Programs


Formula and Performance Based System Preservation Programs
75% of All Funds
Competitive Expansion Programs
25% of All Funds
Sustaining National Connectivity
Sustaining Core Assets
Improving Federal Connections
Improving Core Transportation
Essential Access Program
Performance Bonus
Apply Performance Measures

NEW FORMULA PROGRAMS

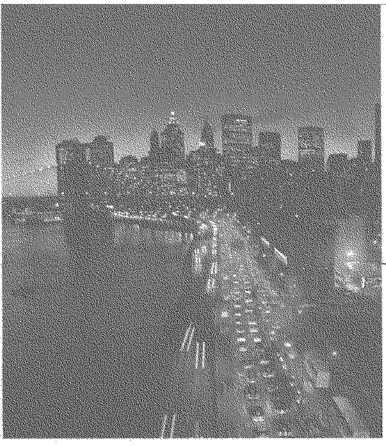
Based on clear evidence that improvements to the management and performance of existing transportation systems generally offer the highest returns, the majority of available funding should be directed to preserving and enhancing the infrastructure and systems that already exist. Timely federal investments in existing systems can maximize the value of investments made in past years and can often make expensive new capital projects unnecessary. Consistent with the national goals we recommend, formula funding for system preservation and optimization should be focused in two areas: (1) national connections and (2) metropolitan regions.

Specifically, we propose a new formula program called **Sustaining National Connectivity (SConnect)** that would target federal funds to those investments most necessary to preserve the national transportation system. A cost-based formula offers the simplest and most direct way of allocating federal funds under this program. Such a formula can, at least initially, make use of the analyses already conducted by U.S. DOT as part of its bi-annual Conditions and Performance report. Another factor to include in the formula could be freight value-ton-miles within a state, to account for rail preservation needs until an objective measure of needs based on freight congestion and bottlenecks can be developed. The formula could also reward efforts by states that have implemented revenue-raising and asset management policies, and have undertaken investments to preserve those elements of these national systems that are located within their boundaries. A significant level of federal support for system preservation would be guaranteed for all states under this formula. The funds would flow directly to states on a mode-neutral basis for the purpose of preserving and enhancing elements of existing transportation systems—including roads and freight and passenger rail—that play a role in connecting the nation. This will require a methodical redefinition of what comprises this federal system, to ensure that included facilities are truly in the national interest. Private infrastructure would be eligible for federal funds provided a compelling justification exists on the basis of public benefits and provided there is an appropriate private match. States would work with U.S. DOT to prioritize activities in line with national goals and track how well their expenditures of federal funds are performing. States could be eligible for supplemental planning funds if they use those funds to collaborate with other states.

In addition, we propose a new program, called **Sustaining Core Assets (SCA)** that would distribute funds to metropolitan areas with more than 200,000 people based on their share of gross domestic product. A regional planning entity designated by the state, typically a metropolitan planning organization (MPO), would prepare a plan that prioritizes preservation activities consistent with state plans and national goals; the same entity would also track the performance of spending under this program. As in the SConnect program, metropolitan areas could receive additional planning funds if they use those funds to collaborate across state and municipal lines in order to enhance connectivity.

NTPP recommends a third formula program to ensure that transportation remains accessible for isolated, disabled, disadvantaged, and underprivileged people in both rural and urban areas. The proposed **Essential Access Program (EAP)** would distribute funding to states based on need, as measured by numbers of people in these demographics. States would then distribute funds based on an application process that evaluates grant proposals using all of the performance metrics, weighted toward the areas that are most in need of essential access.

The chief problem with any formula program is that it fails to provide performance incentives to recipients. Although formulas offer a simple, consistent, and trans-



parent way to distribute funds, they do not address the need for accountability in meeting goals. Thus, NTPP recommends a fourth program to create proper incentives to reward performance in the use of formula funds.

The **Performance Bonus Program (PBP)** would provide additional funds to states and metropolitan regions based on their demonstrated progress toward meeting national performance goals. This would include how well they reduce their backlog of system preservation needs and optimize the performance of existing systems based on the measures in Table 1 above. Recipients could use PBP funds for any transportation purpose with few restrictions. As a corresponding corrective measure, poorly performing states and regions would be subject to greater federal scrutiny and review in the planning process for their formula funds.

NEW COMPETITIVE PROGRAMS

To keep pace with a growing and changing nation, ongoing investment in new transportation infrastructure is needed to ensure that people and goods can continue to move efficiently and in a way that is responsive to new economic, energy security, and environmental challenges. While NTPP recommends using formula programs to fund the preservation and improvement of existing national and metropolitan systems, we recommend a new approach—built on competition—for prioritizing federal investment in new capacity. This will encourage comprehensive planning for future transportation needs and assure that federal support for system expansion furthers the achievement of national goals.

Specifically, we recommend two new competitive funding programs designed to prioritize among competing proposals for federal investment in new infrastructure, which together would account for 25 percent of overall federal transportation funding. Under these programs, U.S. DOT would annually evaluate proposals using the best available data and performance measures and make recommendations to Congress, which would approve final funding on the basis of U.S. DOT's recommendations. Although there may be some controversy about U.S. DOT's ability to make funding recommendations that Congress will respect, we believe this approach can work smoothly, particularly as data quality and performance measurement techniques improve over time.

The competitive programs we propose are designed to direct federal resources (a) toward the investments that offer the greatest returns at the lowest cost, and (b) in amounts that are proportionate to the national benefits to be gained. These programs are not intended to be prescriptive, but to allow for a bottom-up approach in which states and local areas have flexibility to develop proposals that reflect their preferred strategies for advancing national goals. Thus funding could be awarded to support a variety of policies or sets of investments, including public-private partnerships across any and all transportation modes. State and local entities would have to demonstrate that these programs are cost-effective and would produce results aligned with national goals.

We call the first of these new competitive programs **Improving Federal Connections (IFC)**. It would fund the expansion of the national transportation network across modes, with a focus on all forms of freight transportation, together with investments in passenger transportation, such as intercity highway, bus, and rail links, as well as improvements to multimodal access for ports and airports. Any state, region, or locality (or collection of regional, state, or local entities) could apply for grants to fund programs, as opposed to individual projects, that improve the performance of the overall transportation network. As already noted, U.S. DOT would evaluate applications and make funding recommendations subject to Congressional approval. All the performance metrics described previously would apply, but, consistent with the focus of this program, the national connectivity metrics would receive the greatest weight. The amount of federal funding available to any particular proposal would depend on available resources and the number of other cost-beneficial applications received. Grant recipients would be responsible for reporting on whether outcomes were achieved as predicted and states would aggregate these reports to evaluate the overall success of their programs. These evaluations would then be considered in future funding cycles.

In addition, NTPP recommends a second competitive program, called **Improving Core Transportation (ICT)**, to fund transportation-system expansion across all modes in metropolitan areas with populations greater than 500,000, with a set-aside for smaller areas. Metropolitan regions would apply for grants by submitting proposals for programs (again as opposed to projects). Programs funded using this mechanism could include a coordinated mix of public and private capital projects, operating enhancements, and other financial and administrative measures that work together to improve the overall system. As with the proposed IFC program, applications would be evaluated by U.S. DOT and funding would be approved by Congress. All performance metrics would be considered, but the metropolitan accessibility metrics would receive the greatest weight. Grants awarded under this program would be expected to focus on passenger transportation improvements, but freight improvements needed to enhance the overall performance of transportation networks in major metropolitan areas would also be eligible. As before, grant amounts would depend on benefits achieved, total resources available, and the number of other cost-beneficial applications received. Recipients would be responsible for reporting afterwards on whether goals had been accomplished as predicted.

It is difficult to imagine that the programmatic framework for transportation that NTPP recommends can be established in the absence of significant institutional reform at all levels of government. Throughout this report we emphasize the necessity to more clearly define and articulate the federal interest in transportation. But we also aim to propose a strategy that will allow the federal government to partner more effectively with other levels of government and with the private sector.

We propose a strategy that will allow the federal government to partner more effectively with other levels of government and with the private sector.

Public sector roles and responsibilities must be reshaped and reorganized for effectively planning, funding, building, operating, and regulating the nation's transportation system. At the federal level U.S. DOT should be reorganized and better connected to other federal agencies to reflect these interests and values. The organizational structure of DOT should reflect the reorientation of transportation programs around broader national goals, by establishing modal coordinating mechanisms in the Office of the Secretary. Moreover, given the need to integrate policy considerations that go beyond the jurisdiction of traditional transportation agencies—such as energy, environment, housing, and community development—interagency coordination on these issues should also be improved.

With a few exceptions, the transportation planning processes that currently exist at the state and metropolitan levels do not support a strategic, performance-based, and accountable approach to decision-making. NTPP recommends new incentives for improved planning, including offering the carrot of additional planning funds in exchange for collaboration across modal, agency, and jurisdictional lines. This will help to shift the focus to encouraging adequate planning processes, rather than mandating specific institutional structures. We have also concluded that to the extent that current federal financial support for transportation planning is not sufficient or flexible enough to support broader planning efforts by state agencies or MPOs, it should be expanded.

Finally, the success of NTPP's reform agenda depends on data improvements. Reforms and resources will be needed to create the data collection and research capabilities that are essential to the success of a performance-based system.

Revenue and Performance

For many years the gasoline tax provided a stable and growing source of funding for federal transportation investments. The federal gas tax, however, has not kept up with growth in road use, construction costs, and system needs. As a result, the resources available in the Highway Trust Fund are increasingly falling short, which in turn has necessitated transfers from general funds. This situation is clearly unsustainable. Overall gasoline consumption is down—due first to high oil prices earlier this decade and now to the economic recession—and a combination of increased vehicle fuel-economy standards, the introduction of electric and plug-in electric hybrid vehicles, and mandated expansion of biofuels use can be expected to continue to put downward pressure on oil demand. This is obviously beneficial for many reasons, but it also leads to declining receipts from fuel taxes, assuming the level of those taxes is unchanged. All of these developments have combined to expose flaws not only in the stability of the gas tax as a funding source, but also in its long-term sustainability.

There is widespread agreement that revenue currently collected at all levels of government is insufficient to either maintain or improve system performance. The "gap" between transportation "needs" and current investment by all levels of government ranges between $172 billion annually to *maintain* existing infrastructure and $214 billion annually to *improve* system performance.[2] Such "needs" estimates assume that it is possible to calculate an ideal level of investment—a view to which NTPP members do not subscribe. Too many factors (such as policy choices, technology, and prices) can affect the performance of the system and the "need" for capacity, making any interpretation of the term "need" itself relative and shifting. The focus should be on maximizing *valuable* investments where the returns to society are measured and optimized. Transportation investment has not traditionally been thought of in this way, but an approach that seeks to maximize returns is appropriate for allocating scarce resources. The appropriate level of overall investment is obviously important; what the federal government's share of that investment should be is, of course, a separate but also important question.

An equally fundamental concern is that existing revenue mechanisms fail to take advantage of the fact that the performance of the transportation system can be directly influenced by how users pay for it. The gas tax in the United States is very low relative to most developed countries, which means that all taxpayers subsidize the full costs of road use regardless of their contribution to system costs. This has resulted in artificially high demand and a substantial shortfall in the revenues necessary to cover the costs of maintaining the transportation network. Originally seen as a reasonable proxy for system use when first put in place in the 1950's, the gas tax today provides at best a weak and inaccurate price signal; few Americans are even aware of how much they pay through the fuel tax or that their contribution to system maintenance and improvement has steadily decreased over time. A recent report by the National Commission on Surface Transportation Infrastructure Financing concluded that average users pay substantially less than the full costs they impose taking into account the direct costs of wear and tear as well as indirect costs in the form of congestion, greenhouse gas emissions, and energy security impacts. An inaccurate price signal means that millions of individuals and businesses are making transportation decisions that are inefficient from a societal standpoint every day.

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[2] National Surface Transportation Infrastructure Financing Commission. "Paying Our Way- A New Framework for Transportation Finance." Feb. 2009. See chapter two for a detailed analysis, including various scenarios of "the widening investment gap".

For all of these reasons, bold federal leadership is needed to develop, test, and implement new, more direct and more complete ways of linking revenue collection to system use and impacts. Getting the "prices right" and more directly charging users for the full cost of their use offers high economic returns, especially when charges for congestion, national security, and environmental damage are included.

Though the question of how to raise revenue has not been the primary focus of NTPP's efforts, this issue is critically important—precisely because it does ultimately relate to system performance. Thus, NTPP recommends that future efforts to address the need for new transportation revenue-raising mechanisms be guided by the following core principles:[3]

- Revenue currently collected at all levels of government is insufficient either to maintain or improve system performance;
- Revenue collection methodologies should be directly linked to improving system performance;
- Public revenue collection can enhance the performance of the system when users more directly understand and bear the full costs of the infrastructure they use;
- Policy-makers should address the research, standard setting, technology, privacy protection, equity and administration issues for an improved national user-pay funding mechanism, including requiring development of a time-phased implementation plan;
- The recent trend toward financing federal transportation investments with non-user-based, general taxpayer funds should be reversed; and,
- Distribution of federal revenues should promote both accountability and net increases in sustainable state and local revenue sources.

Final Word

Taken together, the recommendations outlined in this report with regard to federal goals, accountability measures, programmatic restructuring, funding approach, and revenue strategies constitute a far-reaching and bold reform agenda. We do not underestimate the difficulty of implementing this agenda. Yet we are equally convinced that the effort to bring about fundamental changes in U.S. transportation policy is not only well-justified by the large benefits that could be achieved—but is in fact necessary given the scale and urgency of the multiple transportation-related challenges the nation faces in the coming decades.

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[3] We note that our recommendations in this regard align closely with conclusions reached by both the National Transportation Policy and Revenue Study Commission and the National Surface Transportation Infrastructure Financing Commission.

Summary of Recommendations

I. Center the national transportation system around five over-arching goals:

a. Economic Growth
b. National Connectivity
c. Metropolitan Accessibility
d. Energy Security and Environmental Protection
e. Safety

II. Align programs and federal funds to progress on a suite of metrics linked to national goals:

a. Access to jobs and labor
b. Access to non-work activities
c. Network utility
d. Corridor congestion
e. Petroleum consumption
f. CO_2 emissions
g. Fatalities and injuries per capita
h. Fatalities and injuries per Vehicle Miles Traveled (VMT)

III. Consolidate current federal programs into two categories:

- ***Formula-Based System Preservation Programs and***
- ***Competitive Capacity Expansion Programs***

a. Merge formula programs into three preservation programs plus a bonus program that together comprise 75% of total funding:

- **i. Sustaining National Connectivity (SConnect)** – to preserve the existing national system
- **ii. Sustaining Core Assets (SCA)** – to preserve existing metropolitan systems
- **iii. Essential Access Program (EAP)** – to provide transportation access for rural areas, the disabled, and the economically disadvantaged
- **iv. Performance Bonus Program (PBP)** – to reward superior programmatic goal alignments in the other three formula programs

b. Merge competitive programs into two new multi-modal competitive capacity expansion grant programs together comprising 25% of total funding:

- **i. Improving Federal Connections (IFC)** – to expand capacity in the national system
- **ii. Improving Core Transportation (ICT)** – to expand capacity in metropolitan areas

IV. Address key enabling measures for the above reforms:

a. Research/Policy Refinement

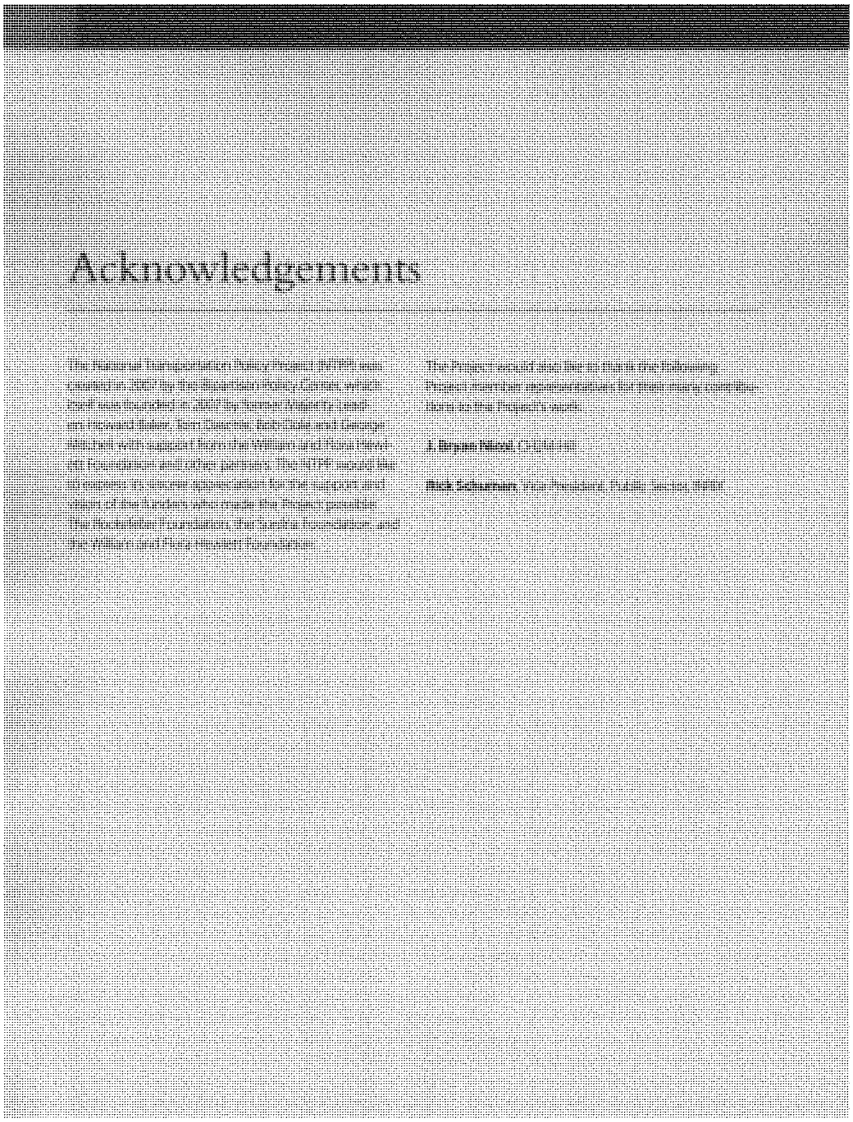
- i. **Develop Data And Metrics –** New and targeted federal research programs to improve transportation data and performance measurement
- ii. **Redefine National System –** Developing a new consensus that redefines what is meant by the federal transportation system through the establishment of a bipartisan commission

b. Institutionalize Alignment

- i. **Focus Dot Organization –** Start organizing the U.S Department of Transportation around national goals by establishing modal coordinating mechanisms within the Office of the Secretary
- ii. **Institutional Dynamic Interagency Coordination –** Establishment of federal interagency mechanisms to coordinate transportation policy with housing, community development, energy, and environmental protection
- iii. **Revitalize Planning –** Conditioning supplemental planning funds on a revitalized transportation planning process

c. Performance-Based Pricing

- i. **Link New Revenue To Performance –** We recognize that additional funds are needed to address vital national interests in transportation, and recommend that new revenues should be user-based and applied to performance-based programs
- ii. **Plan For National User-Fee –** Due to the many benefits of a comprehensive national user-based funding mechanism, NTPP recommends a national commitment to completing the needed research and planning to transition to a national user-pay funding mechanism by a date certain
- iii. **Institute New Mode-Neutral Freight Fee –** NTPP recommends development of a mode-neutral freight fee to fund the needed new focus on critical freight infrastructure
- iv. **Implement And Apply Carbon Pricing –** New climate policies and transportation legislation need to assure that transportation users cover the full costs of their carbon emissions – and that carbon pricing revenue support investments to significantly reduce carbon emissions.
- v. **Support State Funding Flexibilities –** Federal policies and funding should assist states and local governments in developing sustainable funding sources including eliminating federal restrictions on road pricing, supporting efforts by states to implement direct user charges and expanding TIFIA credit support.



Acknowledgements

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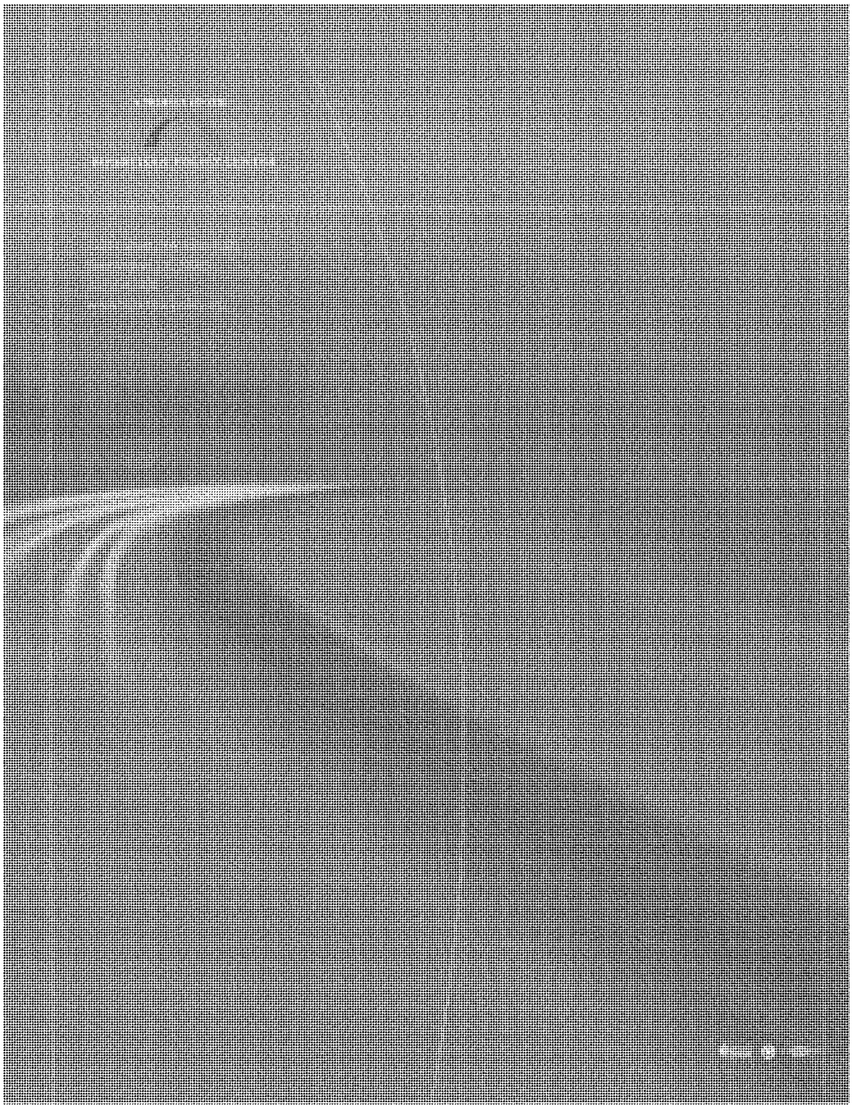
The Project would also like to thank the following Project member representatives for their many contributions to the Project's work.

J. Bryan Nicol, CH2M Hill

Rick Schuman, Vice President, Public Sector, INRIX



Answers to Follow-Up Questions from the Environment and Public Works Committee Hearing of October 29, 2009

Senator Barbara Boxer

1. *Do you believe we need to act quickly to enact legislation to address climate change?*

Climate change is this generation's leading environmental threat. We believe that Congress must act to address climate change as soon as possible—urgency must take precedence over competing views of perfection. In our mind, there is no question that if left unchecked, climate change will compound environmental and economic as well as national security risks to the United States and its citizens. Doing nothing to address the threat will not only negatively and severely impact this generation, but generations to follow. As we continue to defer needed common-sense solutions, the inevitable task at hand simply continues to grow more difficult and expensive.

Senator Bernard Sanders

1. *Do you believe we can get to 1 million plug-in electric and full electric vehicles by 2015 as President Obama has proposed?*

My work with the National Transportation Policy Project (NTPP) did not include substantial research or analysis of this issue, but I support this goal. My feeling is that our nation needs and appreciates challenges such as the one issued by President Obama. When President Kennedy challenged us to put a man on the moon in what seemed like an impossible time frame, we rose to the occasion and made it happen. We are best as a nation when our attitude is that the difficult can be accomplished right away, but the impossible takes a little longer.

2. *Do you believe we need a strategic build-out of recharging stations for electric vehicles, which is something I worked to include in this legislation?*

My work with the National Transportation Policy Project (NTPP) did not include substantial research or analysis of this issue, but we are happy to do some additional research and discuss it with you further.

Senator James M. Inhofe

1. *You seem to endorse at least the idea of the competitive grant program contained in the Kerry-Boxer bill as a means of moving beyond a focus on specific projects and towards a programmatic emphasis. The bill language, however, is not consistent or clear as to whether DOT would be evaluating and subsequently funding implementation of transportation plans, the newly required greenhouse gas strategies or individual projects. Would you please clarify at which level of specificity you believe would be appropriate to award grants under this new program?*

The competitive grant program in the Kerry-Boxer bill should provide funding for transportation investments that are projected to reduce greenhouse gas emissions while also showing demonstrable projected improvements in economic growth and safety. The funding should not be confined to individual projects or emissions reduction strategies, but instead should go towards proposed programs that best accomplish the goals specified. For example, a proposed program could include investments in new infrastructure, but could be accompanied by land use, pricing, or operational strategies that enhance overall performance. Proposed programs should be evaluated on their merits – their comparative ability to make progress on specified national goals for the lowest cost.

2. *Since all States and major metropolitan areas will be required to develop strategies to reduce transportation-related GHG emissions, would you support any of the money for implementing these strategies being distributed via some sort of formula? Or do you believe it should all be distributed at the discretion of the Secretary of Transportation?*

The grant process as designed in this bill helps to encourage innovation and competition between potential grant recipients. When grantees compete on the basis of how well they can meet specific goals, but have strong flexibility as to how they accomplish these goals, this can be a spark that triggers innovative plans that reach across traditional modal and political boundaries. By contrast, formula money does not provide any such incentive or accountability as funding is typically provided in a top-down manner without any reward for better performance. On the other hand, competitive grants should not be distributed at the discretion of the Secretary of Transportation alone. The grant-making process needs to be a joint one between Congress and the Executive, where the Executive branch does the analysis and makes specific recommendations regarding funding, but Congress has the final say. This is a strategy that has worked well in the past to ensure that funding is distributed in a manner that is both effective and equitable.

3. *You advocate for the funding provided for transportation to be mode-neutral. Do you believe the "more accurate price signals" and "user-pay funding mechanism" you endorse should also be mode-neutral?*

It is important that we "get the prices right" in the transportation sector and that all users of transportation systems and facilities should, to the extent practical, bear the full costs of their use. The Kerry-Boxer bill, in assessing charges for carbon content, moves us in this direction, although the

carbon-related charges reflected in the transportation system are unlikely to be sufficient to substantially influence behavior.

Senator BOXER. Absolutely, without objection, and we really appreciate your being here.

Our next witness is—I want to say it right, William Millar, President of the American Public Transportation Association. And we are very honored that you are here with us.

STATEMENT OF WILLIAM MILLAR, PRESIDENT, AMERICAN PUBLIC TRANSPORTATION ASSOCIATION

Mr. MILLAR. Thank you very much, Madam Chairman and Mr. Inhofe. We appreciate the invitation to be with you today.

The Clean Energy Jobs and American Power Act embodied in S. 1733 makes a strong commitment to reducing emissions from the transportation sector, but emission reductions is just one of the benefits. The legislation can help reinvigorate our transportation system while reducing its environmental footprint and expanding much needed employment in America.

As explained by several earlier speakers, including Congressman Boehlert just before me, the transportation sector is a major contributor to greenhouse gas emissions, and we simply have to deal with the transportation sector if we are serious about dealing with this issue.

Now, what do we know about how to tackle transportation emissions issues? We know that we have to improve the mileage of cars. We know we have to improve the mix of fuels. Some Federal legislation has already been handled in those areas, but those alone are not enough. Simply doing those things, as important as they are, will be outdone by population growth and increasing need to travel as America's economy grows in the future.

So we must do other things as well. We must take a systems approach if we are going to achieve the rest of what the transportation sector needs to do. Certainly, investment in public transportation, but also incentives that would coordinate land use, that would improve planning, that would allow innovation in parking in road pricing, all these things together are going to be necessary to make the improvements that we need to do.

Now, this legislation sets reduction targets which are good, and those should then be reflected in the transportation sector. Next, with the assistance provided in this bill, the States and the large metropolitan areas will be required to produce greenhouse gas reduction plans. They can do that as part and parcel of their existing transportation planning process. Smaller metropolitan areas can also do the additional planning if they wish or rely on the States in which they reside.

These are important steps, but planning is not enough. We need implementation of good strategy and good projects that that planning process will result in. So we strongly endorse the bill's allowances that are dedicated to expanding public transportation throughout the system.

Now, we know that public transportation is a proven strategy. We know already from previous studies that over 4.2 billion gallons of fuel, some 37 million metric tons of CO_2, doesn't go into the air each year because of what transit does. In the process, we know transit supports about 1.7 million jobs and apropos of what you heard from the earlier panel, these are the kind of jobs that all of us need to have our economy revitalized.

By the way, the 37 million tons that are saved, imagine if you will if the cities of New York City, Washington, DC, Atlanta, Denver and Los Angeles could somehow do without electricity. That is the amount of carbon we are already saving from going in the air, and we could certainly do much more.

Now, this bill will build on that success record and expand it. We know from Census Bureau work that only about half of all American households even have the choice to use any public transportation. So we are pleased that this bill would allow energy efficient and environmentally efficient transportation options to expand to more places in the country so more Americans would have the choice to use transit if they chose to do so.

We also endorse the bill's competitive grant program for multimodal investments. As Congressman Boehlert said, you know, no one mode is going to be the only answer here. So including, as you have, provisions that would allow that planning process to produce a variety of strategies, and then assist in funding those strategies, is very important indeed.

And these strategies I think are far ranging, beyond public transportation, bicycle, pedestrian facilities, intelligent transportation applications, and of course, inner city and high speed rail solutions as well.

So I think that this legislation is poised to help us. We look forward to working with the committee and working with the Senate.

I do have one caution in this legislation, though, and that is this cannot be a substitute for the existing highway and public transit assistance programs. If we were to put a little money in the right hand pocket and then take the money out with the left hand pocket, we have not helped anybody, and we certainly look forward to working with this committee, the Banking Committee and others in getting a good, long range surface transportation bill.

Thank you very much, Madam Chairman.

[The prepared statement of Mr. Millar follows:]

TESTIMONY OF

WILLIAM MILLAR, PRESIDENT

AMERICAN PUBLIC TRANSPORTATION ASSOCIATION

BEFORE THE

SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

ON

PUBLIC TRANSPORTATION, TRANSPORATION INVESTMENT AND TRANSPORTATION EFFICIENCY IN THE CLEAN ENERGY JOBS AND AMERICAN POWER ACT (S. 1733)

****

October 29, 2009

SUBMITTED BY

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The American Public Transportation Association (APTA) is a nonprofit international association of over 1,500 public and private member organizations, including transit systems and high-speed, intercity and commuter rail operators; planning, design, construction, and finance firms; product and service providers; academic institutions; transit associations and state departments of transportation. APTA members serve the public interest by providing safe, efficient and economical transit services and products. More than 90 percent of the people using public transportation in the United States and Canada are served by APTA member systems.

Introduction

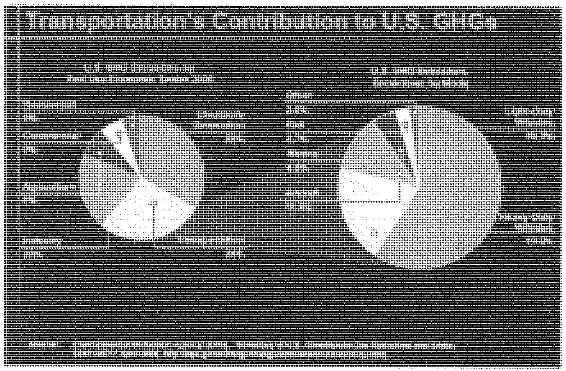
Chairman Boxer and members of the committee, on behalf of the 1,500 member organizations of the American Public Transportation Association (APTA), I thank you for the opportunity to testify today. As this committee examines options for addressing climate change, the transportation sector must be a key consideration. We are very pleased that the legislation being considered by the committee makes a strong commitment to reducing emissions from the transportation sector, but emission reduction is just one of the valuable benefits that the transportation provisions in the bill provides. I believe that the "Clean Energy Jobs and American Power Act" (S.1733) can be a major step forward in the nation's effort to reinvigorate our transportation infrastructure while dramatically reducing its environmental footprint.

The Challenge of Reducing Emissions and Fuel Consumption in the Transportation Sector

While our transportation networks are the arteries of our economy, our current dependence on petroleum-fueled vehicles, strangling congestion, and longer commutes are threatening the health of our planet and diminishing our quality of life. From a pure environmental perspective, as well as the perspectives of economic vitality and livability, climate legislation must do more than make electricity generation and consumption cleaner, it must improve the efficiency of our transportation system and begin to reverse our dependence on imported fuels.

It is useful to review the scale of the challenge regarding transportation-related emissions. According to the Environmental Protection Agency (EPA), 28 percent of all greenhouse gas (GHG) emissions in the U.S. come from transportation, and emissions from transportation are increasing faster than any other sector. Growth in transportation-related emissions represented almost one-half (47 percent) of the increase in total U.S. GHG emissions between 1990 and 2006. In addressing transportation-emissions, I will focus on emissions from cars and trucks. On-road emissions, primarily carbon-dioxide, account for 85 percent of transportation GHGs. When examining the role of transportation in petroleum consumption, the story is very similar. Approximately 70 percent of our petroleum consumption is from transportation. To address emission reduction and reduce fuel use, research clearly shows that we must reexamine how we travel.

Figure 1



A new, first of its kind study, confirms that the single most effective way to address the impact of transportation on climate change is not a singular approach at all. Expanded public transit strategies coordinated with combining travel activity, land use development, and operational efficiencies can significantly reduce greenhouse gases. *Moving Cooler* is a comprehensive analysis sponsored by one of the most diverse groups of transportation interests ever assembled, including Shell Oil, Federal Highway Administration, the Urban Land Institute, the American Public Transportation Association, Environmental Protection Agency, the Natural Resources Defense Council, and many others. The study examined a wide variety of transportation and land use strategies and bundles of these strategies to identify effective combinations of investments and policies that reduce transportation emissions. The study also examined projected future emission levels if transportation patterns are not addressed.

To reduce transportation emissions there are three widely accepted options. First, we can make our cars and trucks more fuel efficient. Second, we can use alternative sources of energy that release fewer greenhouse gases when consumed or produced. Third, we can provide more travel options that allow Americans to leave their cars behind for some or all of their travel needs. While we should undertake all of these options, it is now clear that if we only address vehicle efficiency (corporate average fuel economy standards) and the carbon content of our fuels, we will fall far behind in achieving environmental goals. Future growth in private vehicle travel will overwhelm the benefits of improved vehicle efficiency and new fuels. As documented in *Moving Cooler*, without action to address growth in vehicle travel, greenhouse gas emissions from on-road sources will remain roughly at 2005 levels through 2050.[1] This level of emissions would be far short of a 20 percent reduction target for 2020 (assuming that reduction targets are distributed proportionately across sectors), and it assumes significant improvements in vehicle efficiency will occur, including President Obama's national fuel efficiency standard proposal of 35.5 mpg in 2016.

Public transportation investment, transit-supportive land-use policies and other strategies that promote transportation choices are proven ways to reduce emissions from the transportation sector, and they must be addressed in climate legislation. The transit industry and others who are interested in "green" transportation are very pleased with transportation provisions in the chairman's mark of the "Clean Energy Jobs and American Power Act."

Transportation Provisions in the Chairman's Mark of the "Clean Energy Jobs and American Power Act," S. 1733

The chairman's mark for S. 1733 includes significant provisions that can begin the process of dramatically reducing transportation-related emissions. First, the bill requires the creation of emission reduction targets for the transportation sector that are consistent with national goals the legislation will establish. States and large urban areas will then develop greenhouse gas reduction plans that will be incorporated into the existing transportation planning process. Federal funding for the development of these plans is also included in the bill. These new policies, which have been adopted from the Clean Low-Emissions Affordable New Transportation Equity Act (CLEAN-TEA, S. 575), will help communities evaluate how current transportation investments and land use patterns influence future emission levels. Many communities have already begun examining how to expand mobility for their citizens in a sustainable manner. These provisions will encourage the process, spreading best practices in order to improve outcomes from all transportation investments while strengthening planning activities at state departments of transportation and metropolitan planning organizations.

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[1] Cambridge Systematics, Inc., "Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions." Washington, D.C.: Urban Land Institute, 2009., http://www.movingcooler.info/Library/Documents/Moving%20Cooler%20Executive%20Summary.pdf , pg. 4.

Next, we strongly endorse the bill's proposed funding to expand and improve public transportation service throughout the country. The chairman's mark provides new funding under the existing urban and rural transit formula programs (Sec. 5307/5340 and Sec. 5311 of Title 49, United States Code). Current transit use already saves 4.2 billion gallons of fuel and 37 million metric tons of carbon emissions per year, while supporting 1.7 million jobs.[2] That level of emission reduction is equivalent to eliminating the emissions from the electricity generated for the use of 4.9 million households or every household in Washington, DC; New York City; Atlanta; Denver; and Los Angeles combined. Americans are also riding transit in record numbers: 10.7 billion trips in 2008, the highest level of ridership in 52 years despite the fact that only 53 percent of Americans have access to any transit service.[3] Direct investment in public transportation expands travel options for more Americans, produceing both near-term and long-term emission savings.

The chairman's mark also creates a competitive, multi-modal program to fund transportation projects identified by new regional and state planning efforts to reduce vehicular emissions. As communities and states develop plans to reduce emissions, funding will be made available to develop the most meritorious combination of projects possibly including freight improvements, pedestrian and bicycle infrastructure, operational investments like Intelligent Transportation System (ITS) projects, and high-speed intercity passenger rail development. With regard to transit and the competitive program, we believe that fixed-guide expansion such as light-rail systems, bus-rapid-transit (BRT) installations, and subway extensions that improve land-use, spur private investment and significantly reduce transportation-related emissions could be an important component of successful applications for funding. I would suggest to the committee that the criteria for the competitive program be expanded to require the Secretary of Transportation to evaluate the ability of investments and strategies in emission reduction plans to produce emission savings and other benefits in years beyond the typical 20-year planning horizon. These benefits should not be overlooked. For example, investments in the Boston and New York subway systems made more than a century ago are still benefiting us.

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[2] ICF International, "The Broader Connection between Public Transportation, Energy Conservation and Greenhouse Gas Reductions," February 2008.

[3] U.S. Census Bureau, American Housing Survey 2007, Table 2-8

It is important to note that the investment in transportation in the chairman's mark is intended to benefit cities of all sizes and rural areas throughout the country. Metropolitan areas with populations greater than 200,000 will be required to complete transportation emission reduction plans, but every state, including all urbanized and rural areas, will receive new transit formula funding. In addition, urbanized areas with smaller populations are eligible to apply for funding under the competitive program if they complete greenhouse gas reduction plans. I would suggest to the committee that the legislation be clarified to specify that transit providers in urbanized area with populations of less than 200,000 can use their formula funds even if their metropolitan region chooses not to develop an emission reduction plan. Transit projects in these cities could instead be included in state emission reduction plans.

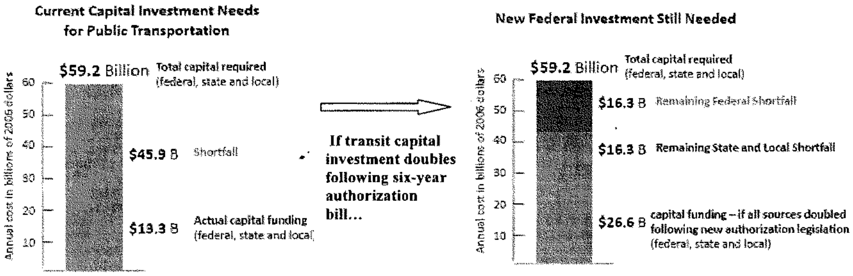
Finally, we applaud the eligibility of transit bus manufacturing facilities for funding under the bill's Clean Vehicle Technology Fund. The deployment of new bus rolling stock makes transit fleets more energy efficient. For example, the fuel economy of hybrid buses in operation today is 10 to 40 percent better than conventional diesel buses. This improved efficiency reduces the cost of providing service and minimizes GHG emissions from transit vehicles. The proposed funding for retooling and expansion of manufacturing facilities can help expand the availability of new energy-efficient vehicles, all of which would be manufactured here in the United States. Long-established "Buy America" requirements in federal law for procurements involving federal assistance require that at least 60 percent of a transit vehicle's components, by cost, must be of domestic origin and final assembly of vehicles must take place exclusively in the U.S. The committee should consider making manufacturers of transit rail vehicles also eligible for funding. Manufacturers of rail rolling stock are making innovative vehicle designs, and rail rolling stock is also subject to "Buy America" requirements.

Climate Legislation and Transportation Investment

When discussing the financing of transit and green transportation investment in climate legislation, I have been asked, "isn't transit and transportation investment addressed in the surface transportation bill?" The federal government is an integral partner in transportation financing, but as this committee knows, the resources of the Federal Highway Trust Fund are being exhausted rapidly. We look forward to working with the Congress to quickly pass a new six-year authorization bill, and APTA has recommended an aggressive program for public transportation that provides no less than $123 billion in federal investment over six years and restores the purchasing power of the federal motor fuels tax. **APTA strongly believes that allowance revenue under climate legislation must supplement, not replace, investment in Federal Transit Administration programs from the Highway Trust Fund and the General Fund.**

According to the American Association of State Highway and Transportation Officials (AASHTO) Bottom Line report, U.S. transit systems need $59.2 billion a year in capital investment to improve and maintain transit infrastructure at a rate that would allow ridership to continue to grow at the record-breaking pace we have witnessed in recent years. The federal government has traditionally provided approximately 50 percent of the capital investment in transit, indicating that a federal program of at least $30 billion a year is needed, but the present federal transit program provides about $11 billion annually. In addition, transit operating expenditures, which are covered mostly from fares and state and local revenues, now run at about $34 billion annually. Even if transit investment were doubled following the next six-year authorization bill, our transit systems would still be undercapitalized and would need substantial additional funding for operations. Congress will need to look to new sources of revenue, and given the contributions of public transportation to reducing emissions, climate change legislation should be one source.

Fig. 2



Public transportation investment is also needed in climate legislation to offset increases in energy-related operations costs for public transportation providers under a cap-and-trade program. Fuel and electricity are a significant component of transit agencies' operating budgets, which are funded overwhelmingly (more than 90 percent) from riders and state and local taxpayers. Transit systems are generally exempt from federal motor fuels taxes to ensure that they can provide as much service as possible, and this principle should be extended to a cap-and trade program. Without transit funding from a cap-and-trade system, public transportation systems could be forced to reduce service levels or raise fares, which decreases the emissions reduction benefits of transit. Service reductions also harm those families who rely on public transportation to get to work, shopping and other daily needs.

Finally, APTA is pleased with the investment proposed in the chairman's mark of S. 1733 because the bill ensures that a portion of the revenue from the sale of emission allowances from on-road fuel consumption is returned to the transportation sector to reduce transportation-related emissions and to improve our nation's transportation infrastructure. Under the House-passed "American Clean Energy Security Act," less than 1 percent of allowance revenue is made eligible for transportation investment, the equivalent of less than $600 million annually. Because transportation investment is only an eligible activity in the House legislation, it is likely that many states and regions would offer zero funding for transportation improvements. In contrast, the chairman's mark of S. 1733 guarantees that between 2 and 3 percent of allowances are available for "green" infrastructure investment, including direct investment in transit systems.

Economic and Consumer Benefits of Transit Investment

Beyond the reduction of emissions and fuel savings, transit and transportation investment in the "Clean Energy Jobs and American Power Act" will drive job creation and help consumers reduce their spending on transportation. Although it has been a part of our lives for more than 150 years, public transportation is one of the best investments to create jobs in the new emerging green economy. A recent report prepared by the Economic Development Research Group shows that every $1 billion of federal investment in public transportation yields 30,000 jobs, and two-thirds of the jobs created or supported with capital investment in the public transit industry replace lost blue-collar jobs with "green jobs" in the public transit sector.[4] By this measurement, the transportation investment in the chairman's mark would support more than 390,000 jobs between 2012 and 2020. Transit investment also has economic benefits beyond job creation. The funding in the chairman's marks will bring an immediate economic impact on job creation and business sales, but it also provides the long-term benefit of improving our nation's transportation system, which in turn improves the efficiency of our economy.

New transit investment will also help individuals and families reduce their commuting costs. Every month APTA releases "*The Transit Savings Report*" which calculates how much money an individual in a two-person household can save by taking public transportation and living with one fewer car. This month's report found that individuals who ride public transportation can save on average $755 a month, a total of $9,062 annually. The savings amount is based on the cost of the national averages for parking and driving, as well as, the October 5 national average gas price of $2.46 per gallon for self-serve regular gasoline as reported by AAA. The savings have grown in recent weeks as fuel prices have increased. Taking public transportation provides a safe and affordable way for individuals and families to cut household costs, and these savings can mitigate the modest changes in energy prices experienced by consumers as carbon emissions are reduced.

Conclusion

APTA applauds the attention of this committee to the pressing issue of climate change, and we thank you for considering the contribution of public transportation toward reducing greenhouse gas emissions from the transportation sector. I want to particularly thank you, Chairman Boxer, as well as Senators Cardin, Carper, Specter, Gillibrand, Lautenberg and Merkley for your interest in public transportation investment and your role in the advancement of the CLEAN-TEA legislation. We look forward to working with you to move the "Clean Energy Jobs and American Power Act" ahead quickly.

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[4] Glen Weisbrod, Economic Development Research Group, Inc. and Arlee Reno, Cambridge Systematics, Inc., "Economic Impact of Public Transportation Investment," October 2009, http://www.apta.com/resources/reportsandpublications/Documents/economic_impact_of_public_transportation_investment.pdfv

Environment and Public Works Committee Hearing
October 29, 2009
Follow-Up Questions for Written Submission
Questions for Millar

Questions from:
Senator Barbara Boxer

1. Do you believe we need to act quickly to enact legislation to address climate change?

APTA believes that the Congress should move with great speed to consider and pass climate legislation. Without action to address growth in vehicle travel, greenhouse gas emissions from on-road sources will remain roughly at 2005 levels through 2050. The "Clean Energy Jobs and American Power Act" (S.1733) would be important step forward toward addressing this issue, and we look forward to working to advance the bill.

Senator Benjamin L. Cardin

Transit Jobs

The American Public Transportation Association estimates that there are more than 382,000 transit workers in the U.S. That does not include workers assembling new rail cars for companies like Alstom or US transit bus manufacturers like GMC and ThomasBuilt. Subway station managers, bus drivers and railcar assembly technicians may not think of themselves as holding "clean energy" jobs, but they are responsible for providing energy efficient transportation for millions of people across the country.

This bill makes significant investments that will expand transit job opportunities across the country. Working with my colleagues, and the chairman, we created a separate allowance allocation specifically for transit investments across the country.

1. What job growth opportunities for the transit sector does this bill provide?

The transit investment in the Clean Energy Jobs and American Power Act will help expand transit service across the country and lead to several types of new job creation. In fact, job creation from public transportation is particularly important because it helps workers whose industries have been particularly hard hit by the economic downturn. For example, there is great need for quality skilled and semi-skilled blue-collar jobs. Both capital investment and public transportation operations spending are particularly successful at generating blue-collar, semi-skilled jobs, and every transit agency needs skilled blue-collar workers like mechanics. Capital investment in buses, trains and related equipment also generates a higher-than-average portion of white collar skilled jobs, including those in engineering and technical professions.

2. In your experience with past federal investments in transit, how long does it take for transportation funds to generate jobs?

Based on the experience of the transit industry with the American Recovery and Reinvestment Act (ARRA), federal funding for public transportation quickly generates job creation. ARRA invested $8.4 billion via transit formula programs. Roughly eight months later, more than 87 percent of the available transit funding, $7.19 billion, has been obligated according the Federal Transit Administration (FTA). This signals that grants for those funds have been approved and project work has started or will start shortly.

A good example of quick job creation is found by examining the use of ARRA funding to purchase transit rolling stock. FTA estimates that ARRA funding will result in the purchase of more than 4,000 new transit vehicles. Orders are placed for vehicles very quickly after grants are approved. When an order for is placed for a new bus or rail car, the ordered vehicle may not be delivered until a year later, but each order leads to original equipment manufacturers

(OEMs) placing immediate orders for large components like transmissions, brake assemblies and air conditioning units and for raw materials like steel. These suppliers in turn contract with hundreds of sub-suppliers across the country to begin manufacturing the thousands of parts that make up the vehicle. For every individual job assembling a bus or rail car, ten or more jobs may be involved in the supply chain for that vehicle.

Transit Oriented Development: Increased Property Values and other External Economic Gains for Communities with Access to Transit

Transportation infrastructure is something that most Americans take for granted. Though when it comes to property values, access to transit and livable communities that reduce driving times and incorporates multi-modal transportation, the market places great value on transportation. [1]

One need only look at the levels of development and property values along the Washington Metropolitan Area Transit Authority system, MARTA in Atlanta, SEPTA in Philadelphia, DART in Dallas and MetroLink in St. Louis to see evidence of the economic benefits of transit. [2]

3. Given the investments in transit this bill makes, what are the economic benefits we can expect to see in communities that invest in and expand their transit systems?

Investment in public transportation improves mobility and can provide multiple economic benefits to the community or region served. Businesses located in areas with public transit service achieve operating cost savings associated with reduced congestion. In addition, businesses achieve greater productivity due to access to larger labor markets with more diverse skills, enabled by expanded service areas. Communities can also expect a shift in consumer spending by public transit passengers from travel and vehicle ownership costs to other spending categories that can increase sales and property tax revenues. These economic benefits are in addition to an increase of jobs related to transit operations, manufacturing, and suppliers demanded by the increased investment and expanded service.

Senator James M. Inhofe

1. You testified about what you called "proven ways" to reduce transportation-related emissions. I don't necessarily agree but for the moment I'll stipulate they are. Even the Moving Cooler report you reference estimates a maximum reduction from these strategies of 15 percent by 2050, and that's by making some very controversial assumptions. The report assumes requiring a growth boundary on all cities of more than 50 thousand people; taking local land use decisions away from local governments and giving them to Metropolitan Planning Organizations; requiring that at least 90 percent of new development be only multi-family homes or on lots of 118th an acre; and exponential increases in annual transit, bike and pedestrian spending. While I'm sure you would support the increase in transit spending, are the other proposals really the types of policies you support as an outcome of the Kerry-Boxer bill?

Moving Cooler analyzes a number of strategies that have been combined into "bundles" to illustrate the potential cumulative emission reductions that could be achieved. The report does not assume that growth boundaries would be required or that land use decisions would be taken away from local governments and given to metropolitan planning organizations. According to *Moving Cooler*, implementation of a complete portfolio of strategies without economy-wide pricing could reduce annual on-road GHG emissions below baseline levels by as much as 18 percent (Aggressive Deployment) to 24 percent (Maximum Effort Deployment). In the strategy bundles that achieve the highest levels of emission reduction, no assumptions are made about changing the authority of local land-use decisions and the bundles do not assume the creation of growth boundaries. The bundles also do not assume prescribed percentages of multi-family housing or lot sizes. Instead, some of the bundles make assumptions about the proportion of development that will occur in relatively dense areas, areas defined as 4,000 persons/square mile. It is important to note that 43% of current development already occurs at this level of density.

The *Moving Cooler* report does not make policy recommendations. Instead, its research should be used as a reference for policymakers to understand how combinations of strategies can effectively reduce on-road emissions. The report also documents that without action to address growth in vehicle travel, greenhouse gas emissions from on-road sources will remain roughly at 2005 levels through 2050. The adoption of transportation strategies that reduce emissions produces significant benefits in addition to emission reduction: reduced consumption of imported petroleum, consumer savings and increased domestic employment. I believe that every community should be given the tools examine their transportation network and identify solutions that increase mobility, reduce emissions and yield other benefits.

2. In previous correspondence with this committee, the Secretary of Transportation stated that, "the energy and emissions savings resulting from using transit depend on multiple factors" and he cited capacity utilization as the most important factor. Congressman Boehlert's written testimony echoes this idea; he says, "It is possible to make poor investments in public transit that actually increase overall emissions." Do you agree, and assuming you do, would you be supportive of including emission reduction requirements for the public transportation program under section 215 of the

Kerry-Boxer bill, just as there is under the other transportation-related grant program created in the bill?

It is certainly possible to make poor transit investments, but transit service overwhelmingly produces net emission reductions. Those who choose to ride public transportation reduce their carbon footprint and conserve energy by eliminating travel that would have otherwise been made in a private vehicle, and even the length of vehicle trips is considerably shorter for households that live near transit. When more transit service is offered, transit providers generally consume more fuel and electricity, but the net result is a reduction in greenhouse gas emissions. Public transportation providers also have an interest in making operations more efficient and reducing fuel consumption. Just like in the private sector, efficiency savings can greatly help a transit agency's bottom line. At present, a great number of transit systems have already begun to invest, often using local funding, in new vehicle technology, such as hybrid buses, and new energy efficient facilities in order to reduce energy consumption and greenhouse gas emissions.

To the question of emission reduction requirements, any requirements should recognize that transit systems must increase fuel consumption and emissions in order to offer greater service. Potential requirements should also recognize that transit service which yields minimal emission reduction still offers many important benefits. For example, late night bus service generally attracts fewer riders than rush hour service, but late night service is critical for many service industry employees. APTA supports efforts to examine and develop performance metrics for many modes, including transit, in the next surface transportation authorization bill. That legislation is the logical venue to address these issues in depth.

Senator BOXER. Well, let me assure you this is not a substitute for anything.

I am so pleased to introduce Mike McKeever because he is the Executive Director of the Sacramento Area Council of Governments, and that particular organization is near and dear to my heart. They are real leaders in transportation planning and combining this with land use, sensible, common sense ideas that have gone a long way to shape our planning efforts in California.

Just for the record, his region includes the following counties: El Dorado, Placer, Sacramento, Sutter, Yolo, and Yuba and 22 cities.

So we are very honored that you could be with us today, Mike. Please go ahead.

STATEMENT OF MIKE MCKEEVER, EXECUTIVE DIRECTOR, SACRAMENTO AREA COUNCIL OF GOVERNMENTS

Mr. MCKEEVER. Thank you, Madam Chairman and Senator Inhofe, for the invitation.

We also cover about 2.3 million people in the SACOG region, and we have been a pretty good test run for many of the transportation planning concepts that are in this bill over the last few years. In many ways, I think we are a pretty good microcosm of the country. Our demographics are similar. We have healthy amounts of rural, suburban and urban development. We have a very strong agricultural economy. We are at the crossroads of major east-west and north-south running freight corridors. And we have a transit system that needs help and more care and attention. And we also have very diverse politics.

And particularly in light of your morning discussion, I do want you to know that the detailed and innovative regional planning process information in my written testimony is supported by a very broad bi-partisan coalition of people, both on my board and within our stakeholder community.

I think that the bill, the transportation planning portions of the bill, will help our region to achieve the goals that we have set for ourselves. I think the bill is relatively simple to understand, at least in these portions. First, I understand the Federal Government will set a national greenhouse gas emissions target for the transportation sector. Second, the States and regions will have to meet certain standards for quality of data and modeling and scenario analysis. And then we will set our own targets in that area. And third, then the Federal Government will provide guidance, technical assistance and financial incentives to help us succeed. It is a good construct.

I do want to acknowledge and thank Congresswoman Matsui from Sacramento, who was instrumental in the Waxman-Markey bill in these particular provisions that are similar. But I want you to know that over the last several years we have engaged literally thousands of citizens in this process, given them good information and listened carefully to what they had to say to us.

And what they had to say was that we needed to make fundamental changes in the way we were growing and the way we were funding our transportation priorities. There are three quick summaries, and it is common sense. One, they told us we need more housing choices. This was based on market research, as well as demographic trends. We need town homes, row houses, small lot single family, condominiums and apartments to go with our abundance of large lot single family products.

Second, we need more transportation choices. We need viable choices in the transit field, pedestrian and bicycle field. We need more streets, but different types that are really designed for all users, not just the automobile. And we need targeted capacity improvements in our freeway and highway system for both goods movement as well as the farm to market, reinvesting in our farm to market system.

And finally, in brief summary of what we are doing, we are going back to old school community design, building neighborhoods and cities the way we used to where homes and shops and jobs and schools and parks are all located close together, very popular in our region. We have many wonderful examples of that built all around this country. People love them, and now we are starting to build them again.

In this capital region, you see mixed use developments going up around the metro system. We see suburban developments built to smart growth around our region, and we also see revitalization going on in rural towns. So this is something where everybody participates. It is not just a part of the area.

Now, there are many other benefits to greenhouse gas reduction planning as one of my panelists indicated. You have less congestion. You have less time in traffic, whether you are a trucker or a family member. You have lower water use, lower energy use in your buildings. You save more farmland and open space, and you reduce health costs from air pollution problems. And so there are multiple benefits.

We do have an innovative new law in California that I refer to in my written testimony, Senate Bill 375, that links together these different planning disciplines. I do want to say that I think the Federal Government has a legitimate financial and policy interest in this issue. But we do appreciate that this bill is structured to leave the actual writing and implementation of the plans to the States and the regions. We think that is the right partnership. We think it will promote cost efficient cooperation and competitive innovation amongst and between the regions and the States, and that is a good model, and we appreciate it.

I do want to thank you again, and thank you in particular, Madam Chairman, for your leadership in this area.

[The prepared statement of Mr. McKeever follows:]

Sacramento Region: The Evolution of Integrated Transportation Planning

To Accompany Oral Testimony of:
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Hearing on S. 1733, Clean Energy Jobs and American Power Act
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Chairman Boxer and members of the Committee: thank you for the opportunity to participate in your hearing on the Clean Energy Jobs and American Power Act. I will focus on the sections of the bill that relate to transportation planning and funding. I believe the bill has the right approach in these areas, and will result in significant changes and benefits to citizens in urban, suburban and rural areas throughout our country.

After offering my thoughts on the legislation before you I provide a case study of the Sacramento Area Council of Governments' (SACOG) evolution in integrated transportation, land use and air quality planning over the last ten years. The Sacramento region provides a good test case for the country. Over the past few decades we have been a fast-growing, mid-sized, metropolitan area. Today, we have over 2.3 million people in 22 cities and six counties. Our central city, Sacramento, is the state capital and the region's largest employment center. However, we have two other large employment centers in our inner-ring suburbs of Rancho Cordova/Folsom and Roseville/Rocklin. We have a number of small towns, with roots in our storied gold rush and agricultural history. We have some of the best farmland in the world, and large expanses of high-quality natural resources and forested areas. We are also the intersection of major north-south and east-west truck and rail freight corridors. The Sacramento region's demographics are very similar to the country's, and the region is sometimes used for marketing research for this reason.

SACOG's story will also be of interest because it is now part of a statewide effort in California to integrate climate change, transportation, land use and housing plans. Many of the other regions in the state have conducted similar scenario planning over the last several years, and a year ago Governor Schwarzenegger signed Senate Bill 375, which directs the California Air Resources Board to provide 18 regional agencies with greenhouse gas emissions reduction targets for cars and light duty vehicles by 2010. The regions must meet the targets through their Regional Transportation Plans (RTPs, or Metropolitan Transportation Plans (MTPs) in the Sacramento region), if feasible, but it is not a mandate. Local land use authority is preserved, and reforms to the California Environmental Quality Act provide strong incentives to make it easier to build housing and mixed-use development projects that help to reduce greenhouse gas emissions. The law is in its early stages of implementation.

The fundamentals of the transportation planning provisions in the legislation you have before you are relatively straightforward. From the perspective of this regional agency executive director, they send three basic messages:

- the federal government will identify a targeted amount of greenhouse gas emissions reductions from the surface transportation sector as a national policy goal;
- states and regions will be required to meet certain quality standards for data, modeling, analysis of a range of future scenarios, and to set their own performance targets for greenhouse gas emissions reductions in the surface transportation sector; and
- federal agencies will provide guidance, technical assistance and financial incentives to help the states and regions succeed in meeting their targets.

The SACOG story told below leads me to believe that this simple, practical approach to improving the state and regional transportation decision-making processes will yield substantial results. Over a decade, we have learned some important "big" lessons from our integrated planning commitment, including:

1. It is possible for a relatively small regional agency (about 50 employees) to develop state-of-the-art data, models and civic engagement methods.
2. Information is very powerful — citizens, stakeholders, local governments and others will act to change their traditional practices if provided credible, objective information about future impacts, trade-offs and choices.
3. Broad-based cooperation and agreement is possible — citizens, stakeholders and local governments through traditional democracy processes are capable of thinking beyond their borders and selecting options that optimize benefits at all scales for a wide range of conditions and interests.
4. Improved quality of life is about increasing choices, not decreasing choices — the growth patterns of the recent past too often limited transportation, housing and community living environment choices to monolithic products.
5. New growth patterns that provide choices cost less — by over $16 billion through 2050 in our region alone.
6. A classic top-down regulatory system is not needed to effect change — in fact a bottom-up approach is more effective because it stimulates locally tailored innovation, and competition.

I do encourage you to increase the allowance for clean transportation projects beyond the roughly 3 percent in the bill. The transportation sector contributes nearly 30 percent of the greenhouse gas emissions in the country, and there is a lot of evidence that there are viable ways that sector can produce major reductions in emissions, both in the short term and over the long term. A higher transportation allowance would send a stronger signal to the states and regions that improvements in the transportation sector are a high national priority. I also support tying the funding to performance. The SACOG story, below, highlights the sttong performance outcomes that can be realized by increasing access to transit funding, in particular, in the near-term in order to achieve the full benefits of integrated regional planning.

THE EVOLUTION OF INTEGRATED REGIONAL TRANSPORTATION PLANNING IN THE SACOG REGION

For the past decade, the Sacramento region has been deeply invested in the development, adoption and implementation of integrated land use, transportation and air quality planning. The effort is led by the Sacramento Area Council of Governments, the Metropolitan Planning Organization (MPO) for the six-county region (Sacramento, Yolo, Sutter, Yuba, Placer and El Dorado) and the twenty two cities within. Since 1999, the SACOG Board of Directors has adopted four major plans: the 1999 Metropolitan Transportation Plan (MTP), the 2002 MTP, the Blueprint long-range growth strategy (adopted in 2004), and the 2008 MTP. As the surface transportation law has evolved from ISTEA (1991) to TEA-21 (1998) to SAFETEA-LU (2005), so too has the way that the Sacramento region does transportation planning.

1999 MTP — The last of the traditional transportation plans

As the MPO for the region, SACOG is required to regularly update its MTP in a manner that is consistent with federal and state requirements, including the Federal Clean Air Act. Since 1974, portions of the SACOG region have not been able to attain the standards of the Clean Air Act, requiring that each MTP meet "conformity" requirements to ensure that the region is making adequate progress towards meeting the clean air standards.

Like many regional agencies around the country, SACOG produced its 1999 MTP largely by combining the individual transportation plans of its member cities, counties, and various transit districts into what then qualified as a regional plan. While this approach had a certain perceived benefit to member agencies and partners, it did not optimize the regional travel performance of the transportation system or air emissions.

The underlying projected land use pattern for the 1999 plan was worked out by SACOG staff and senior planning staff of the local governments, based on their existing general plans, codes and development trends. There was no regional analysis or proactive behavior on SACOG's part, such as explaining how the trend in development patterns might damage or benefit regional travel patterns and air emissions. SACOG did not have parcel-level GIS data for most of its region, so it was unable to analyze land use trends in a detailed manner. SACOG's regional travel model, SACMET, was a traditional four-step travel model with households and employment aggregated to travel analysis zones as the basic unit of analysis. Citizen and stakeholder involvement was limited to one town hall meeting in each county, making requested presentations, consulting with a standing SACOG committee of primarily senior public works staff from local governments, and a public hearing.

The plan was unanimously adopted by the SACOG Board of Directors, but its projected performance was modest to disappointing. The share of trips by transit was projected to stay constant at 1 percent, the share of pedestrian and bicycle trips declined from 7.7 percent to 7.2 percent, the daily vehicle miles traveled (VMT) per capita increased by 6 percent, and commute period congested VMT per capita increased by 360 percent. A lawsuit against the MTP was filed by a Sacramento environmental organization. The group opposed several road capacity projects in the plan and challenged technical and process details of the air quality conformity finding. The suit was settled in SACOG's favor, with a commitment to a more extensive public review process for the air quality conformity finding in the next MTP cycle.

2002 MTP — The first step towards integrated planning

The SACOG Board appointed a 55-person Transportation Roundtable to oversee development of the 2002 MTP. The Roundtable was broadly representative of the diverse interests in the SACOG region, from business and development interests to activists for environmental, housing and social justice issues, as well as civic organizations and academia.

Over a two-year professionally facilitated process, the Roundtable developed decision-making ground rules. To capture the broad range of ideas and opinions, the Roundtable designed a range of transportation scenarios and asked SACOG to model the impacts of each, including one scenario that invested all of the available funds into road capacity enhancements, and one scenario that, instead, invested all of the funds into improvements to transit, walking, and bicycling systems. SACOG's technical capabilities had improved since the 1999 MTP. A regional geographic information system (GIS) was forming with cooperative working groups of the cities, counties, electric utilities, fire services and others in the region. The Sacramento regional GIS Collective was formed to improve the quality and lower the cost of detailed land use data and to establish standards and protocols that enabled data sharing among agencies. A new travel survey of 4,000 households in the region was conducted and then used to update the SACMET travel model. Other data and model improvements included splitting some zones to improve details in certain areas, improving a Pedestrian Environment Factor first tested in 1999, auto and transit costs, and networks.

The results of modeling indicated that neither extreme approach would yield a well-functioning regional transportation system. The scenario that balanced investment in automobile capacity with investments in the other modes performed better.

Early in the Roundtable's work, some SACOG board members familiar with the Envision Utah scenario planning exercise advocated for a scenario to be developed that emphasized what were coming to be known as smart growth principles (e.g., mixing land uses, growing more compactly, and using pedestrian and transit-oriented design principles). Environmental members of the Roundtable were supportive. SACOG's senior staff, supportive in concept, believed that to address land use in a technically and politically effective way would require a greater effort than was possible in the final stages of the 2002 MTP cycle. The SACOG Board agreed with the slower approach recommended by the staff and asked the executive director to pursue funds to conduct a comprehensive land use study to inform the next major MTP update.

Although land use was not thoroughly analyzed in the 2002 MTP that the SACOG Board adopted, the plan did include several groundbreaking features. Most notably, for the first time it established four regional funding programs. A new community design program incentivized smart growth with a half-billion dollars over 25 years, with the three other programs increasing commitments to bicycle and pedestrian investments, enhancing air quality programs, and investing in transportation demand management. Both the process to develop the plan and the plan's substance sent a very clear message to the region. The 2002 MTP was a true regional plan and not, as some had pejoratively described prior plans, a stapled compilation of the individual plans of the cities, counties and transit operators.

The 2002 MTP was unanimously adopted by the SACOG Board, and although the environmental organization that filed lawsuit over the prior plan was still dissatisfied with some of the road investments in the plan, it did not litigate this time. Nevertheless, for all the plan's groundbreaking features, its less-than-stellar projected future travel and air quality performance were of concern to the SACOG Board, staff and many members of the Roundtable. In particular, the plan projected a nearly 60 percent increase in per-household travel spent in heavy congestion over the next 25 years, even with the build out of the MTP's $25 billion list of transportation investments. This realization motivated many key people inside and outside of the government to get serious about a regional land use study. A shift in thinking among opinion leaders throughout the region began to be articulated: maybe congestion could not be resolved through transportation improvements alone. Maybe there was something about growth patterns in the region that was creating a demand for transportation improvements that simply could not be met. It was this environment that led the SACOG Board to launch the regional land use scenario planning project that eventually came to be known as Blueprint.

Blueprint — A new growth vision for the region

The first year of the 30-month Blueprint planning process was spent designing the project, developing strategic partnerships, raising both public and private funds, hiring staff, and significantly upgrading the data and modeling capabilities of the agency. Critical support for this effort came very early in the process from organizations like the Sacramento Metropolitan Chamber of Commerce, Valley Vision (a civic organization) and the local chapter of the Urban Land Institute. Others joined as the project progressed, including the local chapters of the Building Industry Association, American Institute of Architects, and the environmental organization that had sued SACOG over the 1999 MTP. A long-distance partnership with leaders of the Envision Utah project provided strategic and technical advice throughout the Blueprint process.

SACOG embarked on a number of enhancements to its data and modeling capabilities. Most notably parcel-level GIS data, including general plan and zoning designations, lot size, and ownership were developed for all 800,000 parcels throughout the six-county region. For the first time, SACOG used an integrated forecasting model, called MEPLAN. This land use-economic-travel model uses economic costs, development policies (general plans), travel time, and household demographics to allocate future growth. The regional travel model, SACMET, was upgraded in a number of ways, most importantly the addition of a post-processing capacity called "4Ds". The 4Ds (density, diversity, design, and destination) are land use characteristics that influence travel behavior and are added to travel models to better understand the effects of smart growth land use design options on travel. The analysis uses elasticities, or percent change, to modify vehicle trips, vehicle miles traveled (VMT), and mode choices based on changes in the land use characteristics. SACOG also used an Internet-based software application developed by the California Energy Commission, I-PLACE^{3}S, which enabled SACOG to use interactive planning technology in dozens of community meetings as well as providing the kind of parcel-specific land use planning accuracy at a regional scale and real time response speed that was not previously feasible with the desktop GIS version of the software.

PLACE^{3}S was designed to achieve two primary objectives: 1) provide sophisticated, objective technical information to illustrate the complex interrelationships between land use, transportation and air quality issues; and 2) provide that information in an easily-understood and accessible format so that everyone—citizens, policy makers, stakeholders and professional staff —could use it to develop informed opinions. SACOG improved and expanded I-PLACE^{3}S to better serve the needs of regional and local decision making. The Blueprint process was designed to honor the simple precept that an involved and informed citizenry is an essential ingredient of a healthy democracy.

The first product of the effort was a Base Case scenario for growth through the year 2050 that assumed policy and market trend lines of the recent past would continue unchanged. The Base Case was developed by SACOG staff and consultants, with significant input from a first-in-the-region committee of the land use planning directors of SACOG's member cities and counties. A detailed projection for future growth in population, employment and housing in the region was developed by a consulting firm specializing in projections for the California economy. A demographic forecast was also prepared, including changes to the age, household size, ethnicity, and incomes of the region's future population.

These regional-scale growth projections were then allocated to various communities throughout the region. Some of the key assumptions that had to be made to prepare the Base Case included projected housing densities, mix of housing stock between single and multi-family structures, and where the growth would most likely occur. The MEPLAN software was particularly helpful in projecting where market forces were likely to encourage future growth after the capacity of existing general plans was exhausted. The PLACE^{3}S software was used to analyze existing general plan and zoning capacities, natural resource and other constraints, and to prepare a parcel specific 2050 planning scenario for analysis by the travel and air quality models.

The performance metrics for the region in 2050 if the Base Case scenario materialized were very bad Congestion, time devoted to daily travel, supply of affordable housing, conversion of farmland and natural resource lands to urbanization, carbon dioxide and particulate matter all were significantly worse than current conditions. It is not an exaggeration to say the region was stunned. The lead editorial in the *Sacramento Bee* the next day was titled "SACOG shows region the road to ruin." There was a quick and nearly unanimous consensus that the Base Case future was not what the region wanted. But if not the current trends land use scenario, then what?

Alternatives to the Base Case future were needed. These scenarios were designed to test the technical and political viability and the applicability of seven growth management principles, commonly known as smart growth principles:

- Provide a variety of transportation choices
- Offer housing choices and opportunities

- Take advantage of compact development
- Use existing assets
- Mixed land uses and development types
- Preserve open space, farmland, natural beauty, through natural resources conservation
- Encourage distinctive, attractive communities with quality design

The principles were not assumed at the outset to be inherently good or bad, but ideas of sufficient seriousness to be worth examining. The Blueprint tested these principles at three geographic scales: neighborhood, county, and regional.

Before the workshops began, an additional important piece of technical research was conducted. SACOG asked its partners at the Sacramento Metro Chamber, Urban Land Institute, and Building Industry Association to fund and help design a market research study on consumer housing preferences. The study, conducted by a national real estate marketing firm, showed stronger interest than many expected in what at that time were considered "alternative" housing products in the Sacramento region (e.g., single family homes on small lots, attached housing products such as townhomes and condominiums, or housing built in a walkable, mixed-use format). These types of products were not being built in Sacramento when the survey was conducted. Statistical analysis of the survey results showed that two-thirds of the people over 55 in the sample preferred these alternative products. This is the same demographic group SACOG's demographic forecaster estimated would represent a full two-thirds of the growth in the region through 2050.

Neighborhood-scale workshops

A series of thirty neighborhood level workshops were held, at least one in each of 27 of SACOG's 28 member local governments. Multiple workshops were held in the two largest jurisdictions, Sacramento City and Sacramento County. To help reach out to communities across a large region, SACOG turned to Valley Vision, who was a full partner in executing the project. Valley Vision recruited and involved citizens and stakeholders in the workshops, and they formed advisory committees of key opinion leaders and stakeholders within each county to further recruit workshop participants. The goal, realized at most workshops, was to seat individuals from five to seven diverse interests at each small group table, including developers, local property and business owners, citizens, activists from the environmental, housing and other issue specific communities, and public agency representatives.

Each host local government selected two case study sites to be the subject of their workshop, one an example of infill development opportunities and the other an example of "greenfield" (larger tracts of vacant land) development opportunities. Six to eight citizens sat at each work shop table and, after watching an introductory video and PowerPoint presentation about the Blueprint, the region's changing demographics, smart growth principles and some details of the case study sites, they spent the balance of the evening designing a conceptual plan for one of the case study sites.

Project staff designed a series of interactive planning exercises for participants. In their small groups participants used context maps, pictures and data, along with a map of the study area, and a menu of land use options to make decisions that were record by placing stickers on parcels that represented the land uses they wanted in their plan. Roving land use and transportation experts answered questions; a trained facilitator guided the discussion.

A laptop computer and operator, running the new web-based I-PLACE^{3}S software via cell phone connection, were available at each table to enter the plan as the citizens created it and, at various junctures, to tell them how it was performing on key metrics such as jobs-housing balance, housing diversity, vehicle miles traveled, air emissions per household, and mode choice (i.e., percent of trips by car, transit, walking, and biking). An economic reality test included in I-PLACE^{3}S conducted a planning level pro forma analysis on the proposed development ideas for every parcel. This return-on-investment function was used to test the profit performance and, thus, investment feasibility for private developers.

This citizen involvement process reflects a significant advancement from the days of asking citizens "what do you want?" and recording their opinions on flip charts. The entire workshop was designed both to empower the citizens by building their knowledge base and to reinforce the message that this was an information-based planning process, not one that had been pre-cooked in some manner or was dominated by a particular planning philosophy. The technical results of these neighborhood workshops are summarized at **www.sacregionblueprint.org**. Every table's plan is saved on the website and can be viewed at any time.

Two important findings became clear to many SACOG board members. First, the innovative outreach method attracted large numbers of people to the workshops; many were new participants in local land use issues. Second, there was a striking degree of agreement on the types of plans people supported, among the very diverse people at each table, among the tables at each workshop, and among the communities where the workshops were hosted. The smart growth principles of pedestrian and transit design, and housing products that provided far more diversity than common in the current marketplace (in part, to provide greater affordability, but also to meet the needs of the aging population), were supported throughout the region — in low-income neighborhoods in urban Sacramento as well as affluent suburban jurisdictions.

It is worth noting that, of the other regional scenario planning exercises in the country at that time, none had conducted extensive neighborhood-scale planning this early in the process. SACOG was, in fact, pointedly advised by veterans of some of these other planning processes not to do neighborhood-scale planning early in the process because it would generate too much controversy and the project would never be able to proceed to alternative regional scenarios. However, SACOG's approach to Blueprint from the outset was grounded in trying to find land use solutions that would work, would be politically supportable, and could be implemented at-scale quickly. The experience with too many planning projects at all scales is that enthusiasm and therefore, performance falls off after the plan is adopted and moves to implementation. SACOG wanted to minimize the chances for what one representative from the U.S. Department of Energy (one of the funders for the development of the PLACE^{3}S planning method) termed "stranded inspiration."

By the time the neighborhood workshop series was complete, it was clear that the Blueprint project had acquired legs. Many participants commented about how great the experience was. The development community, some of whom were initially skeptical of where the project was headed, gained confidence through seeing first-hand that a wide diversity of citizens supported growth on infill and greenfield sites alike in their communities.

County-scale workshops

SACOG convened committees of senior land use planners within each of the counties and built three alternative county-level planning scenarios for growth through 2050 to compare to the Base Case scenario. The planners started with the citizen input from the neighborhood workshops. They examined the results of the present-day housing market preference survey and the long-range demographic forecast to develop realistic targets for what portion of future housing construction should be planned for about eight different low-, medium- and high-density housing products. Current general plans and zoning codes were assessed to determine to what extent built densities were at or below allowed densities. The planner committees discussed ways it may be possible to change local policies and codes over the next five decades. Each county prepared three scenarios, all designed to use smart growth principles, but in different ways and to different degrees. The overall growth rate within the county also typically varied between the three scenarios. This method of building the county scenarios was designed to blend visionary planning with real-world local policies and market conditions, again, towards the goal of ultimately finding a preferred scenario that would perform well, and could and would actually be implemented.

The county-level round of workshops was conducted with a minimum of one workshop in each county and several in Sacramento County. Modified but familiar maps, charts and stickers seen earlier in the neighborhood workshops were used. But this time the participants had to first choose the county-wide scenario they liked best, either the Base Case or one of the three alternatives. The scenarios were labeled A, B, C and D (an idea borrowed from Envision Utah) to avoid biasing people's opinions about their merits. Valley Vision again recruited and grouped five to seven diverse perspectives at each table. The citizen planners examined large posters with maps and performance metrics, comparing and contrasting the four scenarios, agreed on the single scenario they liked the most, and then used the stickers and felt markers to modify it to make it even more to their liking.

Again, laptop computers and operators were at each table to enter the changes and give immediate feedback on how their changes would alter the performance of the scenario for travel behavior, air quality impacts, jobs-housing balance, total growth, and other impacts measured by I-PLACE^{3}S. This time, the computers were connected to Internet via high-speed connection, not cell phones as at the neighborhood workshops, which helped to transfer the much larger data sets resulting from more parcels at the county scale.

The county workshop series was also well attended and built greater momentum and credibility for the project. People interested more in the environmental protection side of the issue seemed pleased that there was so much support for scenarios based on smart growth principles. People interested more in the housing supply and development side of the issue seemed pleased that the discussion was focused on managing growth well, rather than the often-typical fast-versus-slow or no-growth arguments. Following the county workshops, SACOG staff met with the committee of planners within each county to review the public input and decide which ideas that had been tested were supported by none or few, which ideas were supported by most or all, and which ideas had divided opinion. Through this process, a draft of three scenarios for each county fed into the creation of three regional scenarios.

Regional-scale workshops

An unexpected challenge arose out of this process: there was a great deal of consensus for the preferred growth pattern within the counties. Was there still a need to build alternative regional scenarios? SACOG staff strongly believed there was, if for no other reason than that the county scenarios had been analyzed in the workshops only for their impact on county-wide performance metrics. The project had yet to create a scenario to measure regional performance against the regional Base Case that everyone disliked so much. There were also, however, sufficient variations within the remaining county scenarios to make creating and analyzing the regional scenarios interesting on its own merits. The three regional scenarios that ultimately were created were similar or identical for about 80 percent of the growth through 2050. In one scenario, the final 20 percent of growth was located in small towns (and one new town) around the periphery of the region; in another scenario, the final 20 percent was located in inner-ring suburban locations adjacent to existing urbanization; and in the final scenario, the final 20 percent growth was placed into inner infill and revitalization areas.

The four regional scenarios (Base Case plus three new ones) were also labeled A, B, C and D and taken to a large day-long regional forum attended by 1,500 people in downtown Sacramento. Facilitators for each table were recruited, drawing from local elected officials, senior local government staff, and staff from related state agencies, transit, and air districts. The training the facilitators were required to take, and their direct participation in the event, was an important element in building their understanding and support for what became the final preferred scenario.

Again, Valley Vision recruited and placed the participants at small group tables. After hearing introductory video and PowerPoint presentations, each table spent the balance of the day selecting the regional 2050 scenario they like best and then modifying it with stickers representing different land use types to better meet their preferences. This workshop was so large that SACOG did not have enough laptop computers for each of the 150 tables, so "live" computer analysis was conducted at only a few representative tables.

After the small-group work, participants used individual keypad clickers to record both their personal preferences and the consensus preference of their small group. No tables voted for the Base Case scenario and very few for the scenario that placed the final 20 percent growth in the cities the farthest away from the urban core of the region. The consensus votes of the tables favored the scenario that placed the final 20 percent in the inner suburban areas, while the individual votes favored the scenario that placed the final 20 percent of the growth in inner infill areas — an interesting divergence that turned out to be not particularly difficult to resolve. After analyzing each of the table's maps, SACOG staff prepared a draft preferred scenario that was a balance of the two most popular scenarios from the regional workshop.

Throughout the entire workshop process, SACOG board members, along with key public and private sector opinion leaders from throughout the region, were briefed and provided opportunities to give input and guidance on the project. Regular updates were targeted to the *Sacramento Bee's* editorial board, and to the region's Congressional delegation. Board members were specifically engaged at least monthly, both at committee meetings and at full board meetings. The input from the elected officials hit a crescendo, however, with the last big event of the Blueprint, a first-ever regional summit of all city and county elected officials. In preparation for the summit, a random-sample public opinion poll was taken to measure citizens' attitudes about growth and the principles that underpinned the draft preferred scenario (now modified and re-labeled "Blueprint Principles"). A national polling firm, Wirthlin Worldwide, conducted the survey and its president, the primary pollster for Governor and President Ronald Reagan, came to the summit to present the results personally. Among his key messages and advice to assembled local elected leadership of the region were the key points that citizens were: 1) very nervous about growth, fearing that it would degrade a quality of life that at that time they believed was very high; 2) supportive of using the Blueprint growth principles to manage growth; 3) supportive of regional cooperation for managing growth, but skeptical whether their local officials would do it; and 4) dramatically more positive in their attitudes about the positive aspects of growth if they believed their local communities would use the Blueprint principles to help them make planning decisions.

The elected officials used electronic keypads to identify what aspects of the draft preferred Blueprint alternative they liked and disliked. The draft alternative was very popular with the participants, and the few areas of concern gave SACOG staff fairly clear direction about the types of final refinements needed before taking the plan to the SACOG Board for final action.

By the time the workshops and two regional forums had been conducted in April 2004, more than 5,000 individuals had used the modeling software and given input into the future vision of land use in the Sacramento region.

The Blueprint Decision

In December 2004, the SACOG Board unanimously adopted the Blueprint growth strategy. By this point in the process SACOG had received many regional, state and national awards for the project, including: The Governor's Award for Environmental and Economic Leadership, The Federal Highway Administration/Federal Transit Administration Transportation Planning Excellence Award, the U.S. Environmental Protection Agency National Award for Smart Growth Achievement and the Association of Metropolitan Planning Organizations National Award for Outstanding Achievement. A remarkable broad-based group of supporters, individuals and organizations, came to the SACOG Board meeting to applaud the Board's work; including the Building Industry Association and the environmental organization that had sued SACOG. In fact, the environmental group gave SACOG its Environmental Leadership Award for 2004.

The SACOG Board's Blueprint adoption action included a conceptual map for growth through 2050, a set of Blueprint growth principles, and an implementation strategy. The implementation strategy included actions such as pursuing state legislative reform to amend the California Environmental Quality Act (CEQA) to better promote Blueprint-style growth, development of a rural lands and open space strategy for the region, technical assistance to local governments to help them amend their general plans and zoning codes to reflect the Blueprint, pursuit of financial incentives to assist, in particular, with infill development, and integration of Blueprint into the next MTP.

2008 MTP — The first integrated land use, transportation and air quality plan

Immediately after Blueprint was adopted, SACOG went to work on the 2008 MTP. There were three main, related, technical and regulatory issues to address:

1. How could SACOG best employ the adopted Blueprint as its long term land use plan for determining transportation needs in the MTP?
2. How would the MTP accommodate the new requirements in SAFETEA-LU, the new federal transportation authorization bill?
3. How would the MTP address the new air quality plan (State Implementation Plan or SIP) being prepared by air districts to meet the new, tougher 8-hour ozone standards the federal government had promulgated to replace the 1-hour ozone standard?

SACOG wanted this MTP to be significantly influenced by the Blueprint; that is why the Board had launched the Blueprint in the first place. Federal MTP requirements do not allow an MPO to use a "visionary" land use allocation. In a series of meetings with high-level staff at both the Federal Highway Administration and the U.S. Environmental Protection Agency, it was clear that there would be no latitude to claim air quality benefits unless SACOG could demonstrate they would probably occur. This meant SACOG must demonstrate that projected land uses derived from the Blueprint were realistic and likely to be built. The partnership with the Sacramento Metropolitan Air Quality Management District, an active public agency partnership in the Blueprint process, was essential to working out these issues. Also, SACOG's commitment to extensive data collection, analysis, and state-of-the-art modeling tools was a critical component of persuading the federal oversight agencies that whatever travel and air emissions benefits SACOG claimed in the MTP from the Blueprint would be real and not illusory.

Compliance with new SAFETEA-LU requirements was a little trickier. Most of the new requirements for public participation, safety and security, congestion management and other specific issues were straightforward. More difficult was the requirement that air emission impacts of any MTP adopted after June 30, 2007 must conform to the new 8-hour ozone standard. But it was clear very early that the State of California and its air districts would not have sufficient information from U.S. EPA soon enough to know how to conform to the 8-hour standard by the time SACOG would adopt the MTP. As a result, SACOG "conformed" its new MTP to a bridge State Implementation Plan (SIP), known as the Rate of Progress SIP, and after the 8-hour ozone SIP is completed in late 2008, a new MTP conformity process will be conducted

In addition to meeting these three regulatory requirements, SACOG wanted to produce the new MTP using a stakeholder and citizen involvement process that met, or exceeded, the bar established by the Blueprint. A working committee to create an outreach strategy was established with SACOG's partner Regional Transportation Planning Agencies (RTPAs), the major transit operators, and the Sacramento Metropolitan Air Quality Management District, which had the lead role in developing the new SIP for the region. After the 2002 MTP, public works directors requested greater involvement in developing the next plan. A regional committee of local government public works directors was actively involved throughout the project.

The Analytical Tools

In preparation for both the public workshops and the technical work of the MTP update, SACOG committed to another round of enhancements to its data and models. Workshop capabilities were improved by embedding a somewhat simplified version of SACMET, the 2002 MTP regional travel model, into the I-PLACE^{3}S software so that it could be used interactively to produce travel and land use information in minutes. This upgrade included the "4Ds" land use sensitivities to better capture smart growth details. SACOG's overall analytical capacity was improved by shifting from the SACMET 4-step model to a new, activity-based regional travel model, SACSIM. Activity-based models are the next generation capability in regional travel modeling. These models analyze travel patterns in a fundamentally different manner than traditional 4-step models. The 4-step model segments travel into individual trips by purpose (e.g., home-based work, home-based shop, non-home based). Activity-based models link trips into "tours" that begin and end at home, or work, depending on the list of activities associated with the tour. With this new approach the number and sequence of trips, the modes chosen, the time of day, and the total amount of travel time are internally consistent (less double counting of travel), which is not possible with 4-step models. Also, SACOG built the SACSIM model to function at the parcel level to enhance the ability to capture the benefits of fine-grained smart growth planning options. Other activity-based models may still aggregate data into zones, sometimes several hundred acres each, causing data to be averaged within the zone, reducing resolution and accuracy. I-PLACE^{3}S, with its parcel level land use planning capacity, is a perfect complement to SACSIM for detailed regional analysis outside of real time workshop uses.

The net effect of the parcel specific I-PLACE^{3}S and SACSIM modeling capabilities is like shining a bright light into a room that had been under lit; fine-grain relationships between specific land use choices and travel behavior are suddenly measurable. The prior models simply did not provide for sufficient detail to perform that level of analysis. SACOG's ability to understand the impacts and trade-offs between land use, transportation and air quality choices improved dramatically because of these modeling tools.

The Process

SACOG and its partners designed a two-part workshops series to support the MTP update. A series of 17 community workshops started the process. Valley Vision was reengaged as a partner and used Blueprint recruitment and workshop participant and table perspective diversity techniques. Nearly 1,800 citizen planners came out to workshops throughout the region between February and June 2006.

A transportation version of the Blueprint workshop program was designed, complete with menus, stickers, maps and posters. This time, instead of planning for a specific numbers of new people, jobs and houses coming to the region by 2050, participants were asked to design for mobility in 2035 and they were given a budget to spend. Federal law requires that MTPs only include transportation projects that can be delivered by revenues that are reasonably certain to be available. So, the budget was important to keep the workshops focused on what was realistic, and not an exercise to produce a dream list of ideas.

SACOG staff worked with senior local government planning staff to develop a preliminary land use map to show growth through 2035, the planning horizon year for the MTP. The 2050 Blueprint preferred scenario map was the starting place for developing the 2035 map, with changes made both to reflect the shorter timeframe as well as SACOG's best information on where local governments and the market were performing in ways consistent, or not, with the Blueprint. The preliminary land use allocation for 2035 was significantly refined over the course of the MTP planning process, as more empirical experience became available with Blueprint implementation and SACOG staff had more time to work, in detail, with local government planning staff.

SACOG staff worked with its partners and local agency staff to design three alternative transportation scenarios for each county. Participants listened to a short video and a PowerPoint presentation explaining how the underlying smarter growth land use pattern for this MTP would create more need for investments in alternative modes to the automobile, and for shorter distance automobile trips. Ways to quantify differences in mobility performance among the scenarios were also explained.

Participants in each small group agreed on the scenario they liked best and then used stickers representing a variety of transit, pedestrian, bicycle, and road investments to modify the scenario to better match their preferences. Laptop computers again were used to show participants how their choices changed the performance of the scenario, for better or worse. This may have been the first time in the history of U.S. transportation planning that live feedback on regional travel performance was provided in a public workshop addressing an area this large.

The results of the county workshops were compiled, analyzed with the travel models at SACOG, and used to prepare three regional-scale transportation scenarios. To assist in the development of these scenarios, extensive modeling of alternatives was done in certain key corridors to ensure that all of the possible high-performance options were considered. This was a vastly greater level of transportation modeling to support these early stages of the planning process than SACOG was able to conduct in past MTP cycles. The commitment to base planning decisions on credible, objective information rather than planning philosophy or past plans, whether regional or local in scope, was again demonstrated by the quality, quantity and timing of this travel modeling.

SACOG deviated from the Blueprint approach to the large regional workshop for the MTP. Instead of inviting everyone to a single downtown location, eight simultaneous workshops were held throughout the region, linked by satellite video. The goal was to make it clear, by allowing more people to attend one of eight dispersed workshops that this truly was a regional plan being developed and their input mattered. The event was co-hosted by KCRA 3, the local NBC affiliate with the highest viewership in the Sacramento region. One of the station's news anchors served as emcee throughout the evening. Presentations at the largest site, Memorial Auditorium in downtown Sacramento, were broadcast to all eight sites, along with pre-packaged educational videos. The balance of the citizens' work was done locally at each of the eight workshop locations.

Again, a diverse range of workshop participants sat in small groups, chose which of three regional scenarios they liked the most, and used menus and stickers to refine the map to better match their preferences. As with the county workshops, a budget was imposed. Laptop computers were not used interactively at these workshops, although at the end of the workshop all participants used electronic keypads to record their opinions on key issues. Although there were temporary technical issues with both the satellite and keypad technology at this event, it was a significant success, attended by nearly 1,500 people at the eight locations, and extensive citizen input was provided to guide development of the draft MTP.

The final big public involvement event was an hour-long live television show sponsored by the station, replacing the regular 6:30 newscast on January 31, 2007. Forty studio guests, selected by the station, were seated in an in-the-round, town-hall style studio and responded to questions posed to them by two news anchors. An online poll collected viewer feedback on several questions posed during the show. More than 56,000 viewers tuned in to watch this regional dialogue, and 1,300 gave immediate feedback responses through the interactive poll.

Significant public attitude research also was conducted. A regional telephone poll was completed to test attitudes on different transportation investment options. The poll was supplemented with four geographically representative focus groups of the general public and an online poll. A separate set of eight focus groups was conducted to focus in on environmental justice issues. In total, more than 1,500 individuals gave input through focus groups and scientific surveys. SACOG learned that all areas and groups of residents want a balance of highway/freeway improvements and public transportation expansion, and where there are differences of emphasis.

The Decision

On March 20, 2008, the SACOG Board unanimously adopted the 2008 MTP — the first MTP to explicitly propose a range of policies and associated strategies specifically designed to integrate with a Blueprint-influenced land use pattern. The SACOG Board's action also included the certification of the associated environmental document that includes meaningful mitigation measures to integrate the MTP's transportation plan with land use, air quality, and climate change concerns.

The region's early and serious commitment to integrated land use and transportation planning is evident in the diversity of alternatives to driving alone presented in the MTP that serve the shorter trips made possible through more compact and mixed land uses produced by the Blueprint. By 2035, the projected vehicle miles of travel per household are expected to decline approximately eight percent, while the increased travel within communities is expected to increase — 80 percent in walk/bike trips and 300 percent in transit trips. The transportation investments in the MTP 2035, combined with Blueprint land uses, result in greenhouse gas emissions reductions, lowering CO_2 by 1 million metric tons annually by 2020.

SACOG also developed a Goods Movement Action Plan as part of this MTP process. Important truck corridors were identified, and recommendations included to improve rail freight as well as to revitalize the region's inland port, the Port of West Sacramento. Commercial truck vehicle miles traveled decreased in the plan by 2 percent, even while employment is 5 percent higher compared to the last regional forecast. The largest benefit is a 36 percent reduction in the amount of travel commercial vehicles have in heavy congestion. This improvement in congested travel is due to a transportation system where more local travel does not need to use the major interstates, but can accomplish their travel on arterials, leaving more capacity for longer-distance travel, which is heavily dominated by trucks.

The budget of the 2008 MTP is quite different from previous plans. Leading the change is a 56 percent increase in bicycle and pedestrian investments and a 35 percent increase in smart growth programs. These new investments are made possible by reducing the demand for investment in options that serve only single occupant vehicles and allocating a larger share of flexible revenues to alternatives that meet the future set of mobility demands. Other critical non road-capacity priorities include a 21 percent increase in transit funding and a 17 percent increase in road operations and maintenance funding to better optimize the existing system. These increases offer meaningful progress to support Blueprint implementation and shorter trips, but are limited by constrained dedicated operating revenue sources.

Transit Funding and Land Use Integration Critical to Plan Performance

Through this process, SACOG has learned a great deal about the very close connections between increased transit ridership and land use patterns, air quality and overall transportation system performance. The table below provides the short story of the improvements we will realize by 2035 through the MTP we adopted in 2008 compared to the MTP we adopted in 2002. The MTP we adopted in 2008 significantly increased investments in transit and focuses much more growth into transit corridors. Transit service hours and boardings will grow dramatically. Transit trips grow at an average annual rate of 4 percent — more than double the population growth rate. The growth rate for commute transit trips is even higher, nearly 8 percent.

Overall transit productivity (boardings per service hour) will increase substantially. This will improve the fare-box recovery rate for transit operators and widen the margin of fossil fuel energy savings realized by transit versus automobile travel. The big win: greenhouse gas emissions and vehicle miles traveled per capita decline instead of increasing or staying constant, breaking a decades-long trend that regions throughout the country have experienced. With the transportation sector accounting for such a large share of greenhouse gas emissions, we cannot avert catastrophic climate change without forcing an absolute decline in vehicle miles traveled.

Increased transit ridership also provides major benefits to automobile drivers. The amount of time people have spent sitting in their cars in congested traffic has risen significantly over the past several years. Our 2008 MTP essentially breaks that trend as well, reducing the time people spend in congestion in 2035 from a 114 percent increase to just a 16 percent increase. There are many reasons for this, but targeted transit investments are one of the most important. Our state-of-the-art modeling indicates that we realize approximately a 10 percent reduction in congestion for every 1 percent of total trips that we are able to shift from cars to transit. This is because much of the increase in transit ridership we are forecasting is for commute trips, which are longer and occur during the peak, most congested, hours. When roadways are at capacity, shifting even relatively small percentages of total trips out of cars and onto transit produces large benefits to all users of the system. It also reduces greenhouse gas emissions because stop-and-go, slow-moving traffic creates more greenhouse gas emissions than moderate-speed, smoothly flowing traffic.

Comparison of Plan Performance: 2002 MTP and 2008 MTP

Percent Change from 2005 in:	**2025** (2002 MTP)	**2035** (2008 MTP)
Transit Service Hours	+111%	+283%
Transit Boardings	+98%	+184%
Transit Productivity	+6%	+35%
Greenhouse Gas Emissions/Capita	0%	-8%
Weekday Vehicle Miles Traveled/Capita	+1%	-6%
Congested Vehicle Miles Traveled/Capita	+114%	+16%

In California, we are in the midst of implementing the nation's most comprehensive law linking regional transportation, land use, housing and climate change planning. Senate Bill 375 was sponsored by California Senate President Pro Tempore Darrell Steinberg (Sacramento), and patterned after the SACOG Blueprint. SB 375 requires regional planning agencies like SACOG to meet greenhouse gas emissions targets for 2020 and 2035 that will be set by the California Air Resources Board. As part of our preparations for meeting the provisions of SB 375, SACOG has prepared a TOD (transit-oriented development) scenario for 2020 that makes further improvements on both the smart-growth land use pattern and the transit investments compared to our adopted 2008 MTP. Specifically, the scenario focused about 15 percent more of the growth into transit corridors, and it expedites the construction of the 2035 transit system to 2020.

The data in the table below clearly suggest that even greater performance improvements are possible if land use patterns and funding for transit improves. In the 2020 TOD Scenario greenhouse gas emissions per capita decline more by 2020 than they do by 2035 in our current MTP. It is clear that substantial, quantifiable reductions in per capita greenhouse gas emissions can be achieved through a combination of land use and investments in transit. Congested vehicle miles traveled per capita is also better, only a 2 percent increase from current conditions.

Comparison of Performance: 2008 MTP and 2009 TOD Scenario

Percent Change from 2005 in:	**2020** (2008 MTP)	**2020** (TOD Scenario)
Transit Service Hours	+39%	+184%
Transit Boardings	+64%	+247%
Transit Productivity	+11%	+38%
Greenhouse Gas Emissions/Capita	-4%	-9%
Weekday Vehicle Miles Traveled/Capita	-2%	-6%
Congested Vehicle Miles Traveled/Capita	+21%	+2%

Transit investments must occur early if they are to effectively stimulate the shift in land use patterns to build substantial amounts of transit-oriented development (i.e., higher-density, mixed-use, walkable development near high-quality transit service). Expecting developers to build these new products on the expectation that sometime in the future the funds will be forthcoming to put in the transit lines is not realistic. We have to find a way to do both at the same time. Transit and land use development have a strong synergistic relationship that is lost if they are not done together.

Building transit earlier rather than later is not an unreasonable expectation. There is abundant evidence that citizens support this. Last fall, in the middle of the worst economy of our generation, voters in places as diverse as West Sacramento, Los Angeles, and Marin County approved substantial tax measures dedicated exclusively to increased transit service. The large increases in transit ridership and improved fare-box recovery rates that we have experienced locally over the past year are national trends. A combination of demographic, economic and social trends, along with changes in our built environment, create a unique opportunity for transit to finally be a center piece of not only our nation's transportation strategy, but also our aspirational energy and climate change strategy.

In addition to increasing the total amount of transit investment in its 2008 MTP, SACOG also diversified the transit system. Transit is not a one-size-fits-all investment. In order to serve rural communities, a growing urban core, and older suburban areas alike, the Sacramento region is planning for a wide spectrum of services that suit particular needs. These include: light rail, to connect communities with high population and employment densities; streetcars, to connect regional job centers and also make it easy and simple to get around in pedestrian-oriented urban and town centers; regional rail and express buses, to accommodate long-distance commuters; dial-a-ride or neighborhood shuttles, for rural and suburban communities; as well as fixed-route service, bus rapid transit, paratransit, and subscription buses.

Targeted road capacity investments are important

Important increases in road capacity are part of the 2008 MTP. Strategic road expansions include several carpool/bus lanes, largely in the inner areas of the region, and complete street grids that better serve local transit, bike, pedestrian and auto travel. Through matching MTP investments with supportive Blueprint land uses and focusing on critical bottlenecks, congested vehicles miles of travel per household increase a modest 12 percent versus 60 percent projected in the last plan.

Major land use changes happening

The key elements of the land use pattern in our 2008 MTP include major market shifts away from large-lot single family construction to small-lot single family and attached products (rowhouses, townhomes, apartments), increased amounts of growth through redevelopment and infill opportunities, especially within walking distance of existing and planned transit, and a new style of suburban growth that emphasizes mixed use and walkable neighborhoods. A number of national studies document that market demand is now high for urban and walkable suburban neighborhoods. We certainly have witnessed this in our region, with small-lot and attached housing products growing from 20 percent to 70 percent market share in just the first 4 years of implementing our Blueprint plan. Citizens want to live, work, shop, and play in the kinds of places that transit and smart land-use planning can create. Expanding the choices available for consumers for a wider range of housing types and transportation options will allow them to live the lives they want and produce measurable and astounding reductions in our carbon footprint. It is our job to change our policies and investment priorities to make those choices possible, and in doing so we also protect our rural future and help reduce climate change impacts.

2008 MTP Implementation

SACOG is actively involved in a number of initiatives to implement the 2035 MTP including the **Rural-Urban Connections Strategy** a complementary effort to the Blueprint that developing policy recommendations and technical tools to meet local and regional objectives for enhancing agriculture, rural economies, rural transportation and resource conservation.

SACOG's **Complete Streets Technical Assistance Program** will help communities in the region build more complete streets.

But the largest effort will be the activities necessary to meet the new state law for integrated regional planning, SB 375.

California State Law on Integrated Regional Planning: SB 375

While SACOG was preparing the MTP it adopted in March, 2008 a state law was being drafted to integrate climate, land use, housing and transportation planning in California. The bill, SB 375, was in many ways patterned after the planning process used at SACOG and the other major Metropolitan Planning Organizations in California, all of whom had also conducted sophisticated regional scenario planning exercises over the last decade. The legislation was signed by Governor Schwarzenegger on September 30, 2008. The legislation requires the California Air Resources Board to assign targets for reducing greenhouse gas emissions in 2020 and 2035 to each of the state's 18 MPOs. The bill makes major changes to the California Environmental quality Act (CEQA) to encourage the construction of smart growth housing and mixed use projects, the Regional Housing Needs Assessment (RHNA) statute to make the location of housing consistent with the land use components of Regional Transportation Plans and to require local governments to rezone land consistent with those plans, and to integrate the state's goals for reducing greenhouse gas emissions under AB 32 with Regional Transportation Plans (RTPs, or MTPs in the Sacramento region). The bill, two years in the making, was supported by a unique coalition of the California Building Industry Association, several environmental groups, California League of Cities, County Supervisors Association of California and housing advocacy groups. The three main components of the bill are summarized below.

Sustainable Communities Strategies (SCS) & Regional Transportation Plans (RTP)
By July 1, 2010, the California Air Resources Board (ARB), after considering the recommendations from a broadly based Regional Targets Advisory Committee, must provide targets to Metropolitan Planning Organizations (SACOG in this region) for greenhouse gas emissions for cars and light duty truck trips from the regional land use and transportation system. The MPOs will prepare a Sustainable Communities Strategy (SCS) as a component of their Regional Transportation Plans (RTPs) that meets the target if feasible. If the SCS does not meet the target, the MPO must adopt an Alternative Planning Strategy (APS) that does. However, the MPO is not required to implement the

APS because it may include amounts of transportation funding and changes to land use patterns that go beyond what federal law allows. Several safeguards in the bill are included to preserve local government land use authority, and just like today, in order to receive state or federal funding transportation projects must be included in SACOG's adopted MTP.

California Environmental Quality Act (CEQA) Reform
The methods of CEQA analysis that is required for residential and residential-oriented mixed use projects that are consistent with an SCS or APS that meets the greenhouse gas target are changed.

1. Such projects do not have to analyze their growth inducing impacts or their impacts on climate change or on the regional transportation network.
2. A limited set of projects that meet a very stringent series of environmental and other criteria would be exempt from any CEQA analysis.
3. A substantially more limited CEQA review than normal would be available to projects with a density of 20 dwelling units per acre that are within a half-mile of current or planned high quality transit service for any impacts that are sufficiently analyzed in the RTP environmental impact report and provide adequate mitigation.
4. Local governments can establish their own mitigation standards for local traffic impacts.

Affordable Housing Planning (Regional House Needs Assessment)
Each MPO's process for updating its Regional Housing Needs Assessment (RHNA) will occur every eight years instead of every five years to sync it with updates to RTPs, which occur under federal law in four year increments. The California Department of Housing and Community Development process for setting the regional housing allocations for the MPOs will be amended to encourage providing sufficient housing to match the projected employment growth in a region, and the way the MPOs allocate the housing to each of the cities and counties must be consistent with the SCS.

Summary

The story of these four past major planning actions by SACOG, and its preparation for a fifth, traces a steady evolution to a new style of regional planning. The keys to success were commitments to: the highest quality data and modeling tools — necessary to ground policy making in information; meaningful citizen engagement; and focusing on the connections and interactions between the land use, transportation and air quality planning issues.

Sacramento Region: The Evolution of Integrated Transportation Planning

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Responses to Questions from Ranking Member Inhofe:
U.S. Senate Committee on Environment and Public Works
Hearing on S. 1733, Clean Energy Jobs and American Power Act
October 29, 2009

1. Could you please tell us the total cost of the "Blueprint" and subsequent transportation plan efforts you described in your testimony? Do you know how much of that was for one-time expenses and how much was for things that will have to be repeated either every year or every planning cycle?

   SACOG needed about $1 million per year beyond regular funding sources to conduct the Blueprint. While some specific costs over time decline, there is a large cost for data maintenance that does not decline, and there are new features that we are regularly adding to our models. In our case, we are upgrading our travel model components related to modeling goods and freight movement, vehicle operations to improve greenhouse gas emissions, and transportation pricing, plus land use model components related to residential and commercial development, and infrastructure costs. Therefore, we believe that $1 million per year is a reasonable assumption for ongoing costs. It is important to stress that these are incremental costs. There are substantial resources required for the baseline planning functions that are required on an ongoing basis.

2. What was the level of greenhouse gas emissions attributable to surface transportation in the Sacramento area from 2005 to 2008?

   The greenhouse gas emissions level in the Sacramento region for the four years from 2005 to 2008 from on-road and passenger rail is estimated to be 42.4 $MMTCO_2E$. We do not have data on freight train operations in and through the region, so we do not have an estimate of the freight rail emissions in our region.

Senator BOXER. Thank you so much.

And we hear from our minority witness, Barbara Windsor, President and Chief Executive Office of Hahn Transportation, Inc. And we welcome you.

And I am going to hand the gavel to Senator Carper. Senator Carper, I am going to hand you the gavel because I have a call to return, and I will be right back.

And then for our first question, I promised Senator Inhofe he could go first, and I will go last between the rest of us.

STATEMENT OF BARBARA J. WINDSOR, PRESIDENT AND CHIEF EXECUTIVE OFFICER, HAHN TRANSPORTATION, INC.

Ms. WINDSOR. Thank you, Madam Chair and members of the committee.

I would like to thank you for this opportunity to testify on the Clean Energy Jobs and American Power Act. Yes, my name is Barbara Windsor. I am President and CEO of Hahn Transportation. We are a trucking company headquartered in New Market, Maryland.

My family built and grew the business for the past 75 years, and today we operate 100 trucks and employ over 150 individuals. Our business is very dependent on the plentiful supply of affordable diesel fuel. My company purchases approximately 2,600 gallons of diesel every day. I am also representing the American Trucking Associations as ATA's First Vice Chair.

Trucking delivers virtually all the consumer goods in the U.S. Clothing, food, medicine, appliances and fuel are transported by trucks. As the industry's costs increase, the price of all these essential products must also rise. Our industry has made great strides to improve air quality. Efforts have resulted in near zero emissions for both nitrogen oxide and particulate matter.

Unfortunately, addressing these emissions has reduced our fuel economy as much as 8 to 12 percent, thereby increasing our carbon emissions by requiring us to burn more fuel. If we can reverse this trend and increase fuel economy, greenhouse gas emissions will be reduced.

The technology used to reduce NO_x and PM emissions is very expensive. Compliance with the 2002 EPA emissions standards added $3,000 to $5,000 per truck. The introduction of the ultra-low sulfur fuel added about 5 cents per gallon to the price of our fuel. EPA's 2007 diesel engine standards added an additional $8,000 to $10,000 per truck. And the standards set to take effect in 2010 will further increase new engine costs by approximately $9,000.

While, ATA strongly supports these environmental improvements, we note that these gains come at a substantial cost to our fleets. Congestion mitigation offers one of the most viable strategies for reducing carbon emissions, with the potential to eliminate 314 million tons of carbon and save 32 billion gallons of fuel over the next 10 years.

ATA supports legislation to reauthorize the Highway Program. We believe that reauthorization should have programs specifically aimed at addressing congestion and freight bottlenecks. And we support increasing the fuel tax to achieve these goals.

However, the trucking industry's ability to fund that fuel tax increase could be jeopardized by carbon control mechanisms that will increase the price of our fuel without dedicating this revenue to highway infrastructure improvements.

Trucking is responsible for less than 16 percent of the U.S. carbon emissions. ATA strongly supports the efforts to reduce greenhouse gas emissions and make this country more energy independent. However, the proposed cap and trade system simply will increase the cost of diesel fuel, while failing to reduce carbon emissions from the trucking industry.

As refineries are forced to purchase carbon allowances to cover the emissions of the downstream products they sell, the cost of these allowances will be passed on to consumers. Cap and trade will also increase the volatility of the diesel fuel prices that are fluctuating carbon prices added on to the already volatile pride of our fuel. Volatile fuel prices make it very difficult for the trucking companies to accurately predict their future expense as we sign freight delivery contracts.

The reason that cap and trade will not significantly reduce carbon emissions from the trucking industry is rooted in the fact that trucking is not a discretionary consumer of fuel. Proponents of the cap and trade system believe by increasing the price of fuel, consumers will reduce the consumption of gasoline. This rationale does not translate into the trucking industry, which is a non-discretionary consumer of diesel fuel without viable alternatives.

Even if the price of diesel fuel is dramatically increased by cap and trade, the trucking industry must continue to use fossil fuel. While various proponents of alternative fuels cite natural gas and biodiesel as potential alternatives to diesel, our written testimony shows that these fuels are currently not viable for our trucking industry.

As you move forward with the cap and trade legislation, refinery carbon caps should not apply to downstream combustion of the transportation fuels.

Thank you for this opportunity to testify. I look forward to answering any of your questions.

[The prepared statement of Ms. Windsor follows:]

AMERICAN
TRUCKING
ASSOCIATIONS

Before the
Senate Committee on Environment and Public Works

Statement of Barbara Windsor
President
Hahn Transportation
90 West Main Street
New Market, Maryland

on behalf of the
American Trucking Associations, Inc. (ATA)

Legislative Hearing on S. 1733, Clean Energy Jobs and American Power Act

October 29, 2009

Mr. Chairman and Members of the Committee:

Thank you for the opportunity to present testimony on *S. 1733 the Clean Energy Jobs and American Power Act.* My name is Barbara Windsor, and I am the President of Hahn Transportation, a trucking company headquartered in New Market, Maryland. My family built and grew this business over the past 75 years and today we operate more than 100 trucks and employ over 150 individuals. As a trucking company, we are dependent on a plentiful supply of affordable diesel fuel. In fact, our company purchases approximately 2,600 gallons of diesel fuel daily to ensure that our trucks are able to deliver freight to our customers.

Today, I appear before you representing not just my company, but also the American Trucking Associations (ATA). I am proud to serve as ATA's First Vice Chairman. ATA is the national trade association of the trucking industry. Through its affiliated state trucking associations, affiliated conferences and other organizations, ATA represents more than 37,000 trucking companies throughout the United States.

The trucking industry is the backbone of this nation's economy - accounting for more than 80% of the nation's freight bill and employing nearly 9 million Americans in trucking-related jobs. The trucking industry delivers virtually all of the consumer goods in the United States. We are an extremely competitive industry comprised largely of small businesses. Roughly 96% of all interstate motor carriers operate 20 or fewer trucks.

I. Overview of the Trucking Industry

With more than 600,000 interstate motor carriers in the U.S., the trucking industry is the driving force behind the nation's economy. Trucks haul nearly every consumer good – food, clothing, medicine, appliances, and fuel are all transported by trucks at some point in the supply chain. As the trucking industry's costs increase, the price of all of these essential products also must rise. Few Americans realize that trucks deliver nearly 70 percent of all freight tonnage or that 80 percent of the nation's communities receive their goods exclusively by truck. Even fewer are aware of the significant employment, personal income, and tax revenue generated by the motor carrier industry.

Nearly 9 million people employed in the trucking industry move approximately 11 billion tons of freight annually across the nation. Trucking annually generates $660 billion in revenues and represents roughly 5 percent of our nation's Gross Domestic Product. One out of every 13 people working in the private sector in the U.S. is employed in a trucking-related job ranging across the manufacturing, retail, public utility, construction, service, transportation, mining, and agricultural sectors. Of those employed in private-sector trucking-related jobs, 3.5 million are truck drivers.

The trucking industry consists of both large national enterprises as well as a host of small businesses, all of whom operate in extremely competitive business environments with narrow profit margins. Roughly 96 percent of motor carriers have 20 or fewer trucks and are considered small businesses.

A. Environmental Improvements in the Trucking Industry

The trucking industry is proud of our investments to improve our nation's air quality that has resulted in near-zero emissions for both nitrogen oxide (NOx) and particulate matter (PM). The 2010 model year marks the third generation of EPA diesel engine emission reductions over the last seven years. This year alone, every 60 new trucks purchased will equal emissions of PM from 6 trucks purchased just three years ago and of a single new truck purchased 20 years ago. Today's trucks also began the first half of what ultimately will be an additional 90 percent reduction in NOx emissions.

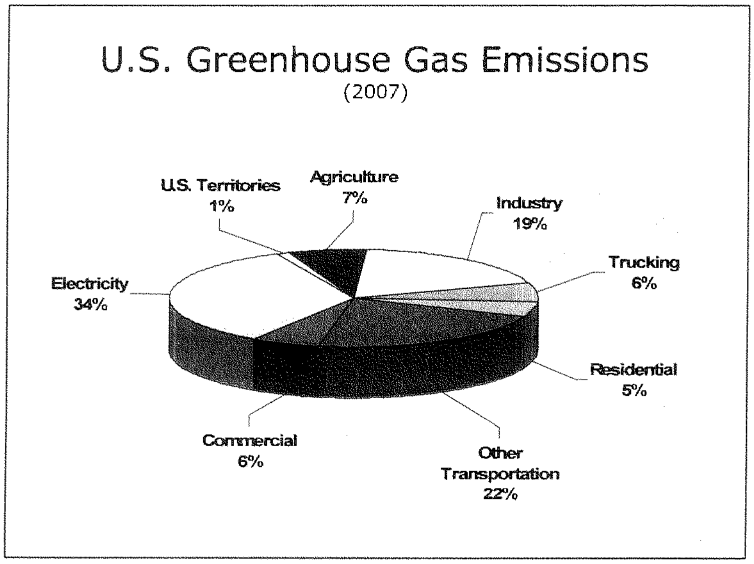
However, addressing these emissions reduced our fuel economy by as much as 8-12 percent over the last seven years; thereby increasing carbon emissions by requiring us to burn more fuel. If we can reverse this trend and increase fuel economy, GHG emissions will be reduced.

The new technology for NOx and PM reductions also comes with significant financial costs. For instance, in the case of the diesel engine emission standards imposed in 2002, engine costs increased by $3,000 to $5,000. EPA's 2007 diesel engine standards added another $8,000 to $10,000 per truck. Standards set to take effect in 2010 will again increase new engine costs by an additional $6,000 to $10,000. While industry strongly supports these emission objectives, it should not be lost that these gains come at substantial costs to our trucking fleets.

B. Trucking Industry's Carbon Footprint

Ultra low sulfur diesel fuel plays a critical role in the trucking industry. Diesel fuel's high energy content is necessary to transport widely diversified loads under extreme operating conditions and achieve reasonable fuel economy. Diesel fuel is the main source of carbon emissions from our industry equating to 22.2 pounds of CO_2 equivalent per gallon of fuel at the point of combustion and 27.1 pounds of CO_2 equivalent when accounting for its lifecycle emissions.

While the transportation sector emits 28 percent of all U.S. GHG's, trucking contributes ***less*** than 6 percent of total U.S. carbon emissions.[1]



ATA strongly supports efforts to reduce GHG emissions and to make this country more energy independent. The question that must be answered is "what is the best way to control GHG emissions in an industry that does not consume diesel fuel and emit carbon on a discretionary basis?" We address this issue in more detail below, describing why a cap and trade system is inappropriate for controlling carbon emissions from commercial trucks and then discussing alternative carbon control mechanisms.

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[1] Source: U.S. EPA's *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007* (April 15, 2009).

II. Trucking Industry Concerns Over an Economy-Wide Cap and Trade System

Unfortunately, an economy-wide cap and trade system will increase the price and volatility of the diesel fuel the trucking industry depends upon, while failing to significantly reduce carbon emissions from our industry. We explain each of these impacts below:

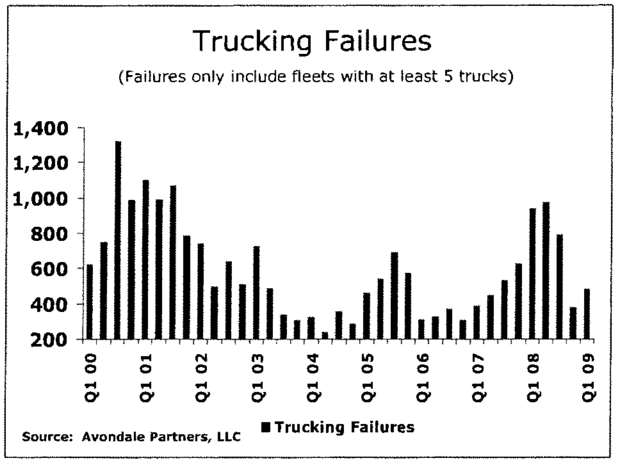
A. Increased Fuel Costs

Diesel fuel is the lifeblood of the trucking industry. In 2008 trucking consumed over 39 billion gallons of diesel fuel. This means that a one-cent increase in the average price of diesel costs the trucking industry an additional $390 million in fuel expenses. Fleets spent an astonishing $151 billion on fuel in 2008, a $36 billion increase from 2007 and more than double the amount spent in 2004.

An economy-wide cap and trade system requires refineries to purchase carbon allowances to cover their direct refinery emissions, and additional allowances to cover the amount of carbon produced by the downstream combustion of the fuels they produce. The costs associated with obtaining these carbon allowances will be passed on the fuel consumers in the form of higher prices. A major petroleum supplier to the trucking industry has advised that diesel fuel costs could rise by up to 88 cents.

The trucking industry is one of the most competitive in the nation, with most companies operating on razor thin margins of 2 - 4 percent. Due to the intense competition within the industry, many trucking companies have difficulty passing cost increases on to their customers. This explains why many trucking companies are reporting that as fuel prices increase, profits are greatly suppressed, if they are making a profit at all.

Fuel price increases take their toll on the trucking industry. With the downturn in the economy and soft demand for freight transportation services, trucking companies are struggling to survive. In 2007, 2008 and 2009, nearly 6,000 trucking companies with at least 5 trucks failed. Additionally, thousands of independent operators, drivers, and employees have lost their jobs.



Source: Avondale Partners, LLC

A large number of companies that operate fewer than 5 trucks have also turned in their keys. These hardships surprise few in the industry, but may surprise those less familiar with the nature of freight movement.

Cap and trade will not only increase the price of diesel fuel, it also will increase the volatility of diesel prices, as a fluctuating carbon price is added to an already volatile fuel price. Volatile fuel prices make it very difficult for trucking companies to accurately predict their future expenses as they sign freight delivery contracts. Even those trucking companies that have established a fuel surcharge program designed to pass-on diesel fuel price increases will suffer from the time lag between daily fuel price changes and the periodic surcharge adjustments built in to shipping contracts.

We are concerned with the support of various investment banks for a cap and trade system, as these Wall Street firms would derive significant profits from volatility in the energy futures markets and the development of a new carbon derivatives market. ATA believes that it is critical to enact commodities trading reforms prior to the creation of new physical and derivative carbon markets. ATA has been a vocal advocate for greater government oversight of markets that impact our industry in order curb excessive speculation. The dramatic surge in fuel prices last summer taught our industry a valuable lesson about the impact of excessive speculation in the energy commodities markets. Carbon markets have the potential to add yet another layer of expense and volatility to the cost of diesel fuel – a cost increase that can very easily devastate trucking company operations.

It is clear that the cap and trade proposal will increase the cost of diesel fuel and increase its price volatility. Each of these effects will harm the trucking industry and American consumers.

B. Cap and Trade Will Not Reduce Trucking's Carbon Emissions

Perhaps the most troubling aspect of the cap and trade approach is that notwithstanding the additional money that consumers will have to spend on diesel fuel, the approach will not significantly reduce carbon emissions from the trucking industry.

The reason that the proposed cap and trade legislation will not reduce carbon emissions in the trucking industry is rooted in the fact that trucking is not a discretionary consumer of fuel. Proponents of an economy-wide cap and trade system believe that by increasing the price of fuel, consumers will reduce their consumption of gasoline. This rationale does not translate well to the trucking industry, which is a *non-discretionary* consumer of diesel fuel.

The trucking industry consumes approximately 39 billion gallons of diesel fuel to deliver virtually all of the nation's consumer goods. This will continue to be the case for the foreseeable future, even if the price of diesel fuel is dramatically increased by cap and trade, as the trucking industry does not have any viable near-term alternatives to diesel. While various proponents of alternative fuels cite to natural gas and biodiesel as potential alternatives to petroleum-based diesel, for the reasons set forth below these alternative fuels are not currently viable alternatives for the trucking industry.

Natural Gas

ATA supports the voluntary use of natural gas as a lower-carbon alternative fuel. Liquefied natural gas (LNG) may reduce carbon emissions by 15 to 25 percent, depending upon the source of the natural gas and the efficiency of the natural gas liquefaction facility.

LNG is not a viable alternative for most long-haul trucking operations. LNG could be an acceptable fuel solution for certain short-haul applications within an industry as diverse as trucking; however, there are significant hurdles to overcome, before natural gas can begin to be used as a substitute for diesel fuel.

The cost of a natural gas truck is prohibitively expensive. Natural gas trucks typically cost $40,000 - $75,000 more than a comparable diesel truck. In addition, natural gas trucks weigh more than their diesel counterparts, which impact the amount of freight that a natural gas trucks can legally carry. As a petroleum hauler, a 500 to 1,000 pound weight penalty translates directly to a reduction of 70 to 140 gallons of fuel that the truck can legally deliver to local gas stations. This 10 percent reduction in payload capacity would require me to operate more trucks to deliver the same amount of fuel I deliver today – dramatically increasing the cost of delivery and eroding much of the carbon reduction benefits that would be derived from using natural gas.

The most significant hurdle to the use of LNG is the lack of a competitive refueling infrastructure. LNG trucks must be refueled at specialized stations that are configured for the specific truck. Running out of gas on the side of the road is a significant challenge as LNG mobile refueling is not an option and the truck would have to be towed to the refueling station. A fast-fill LNG station can cost almost a million dollars to build, which stands as a significant barrier to the development of a competitive refueling infrastructure.

Biodiesel

ATA supports the voluntary use of high quality biodiesel in low percentage blends that meet the ASTM-International diesel fuel standard (ASTM D975). Biodiesel is an alternative fuel that can help reduce our dependence on foreign sources of petroleum; however, biodiesel is not a viable low carbon replacement for diesel fuel.

a. Biodiesel - Questionable Carbon Footprint

Our first concern with biodiesel is the uncertainty surrounding its carbon footprint. While EPA has not yet finalized its Renewable Fuel Standard rulemaking, it is clear from the notice of proposed rulemaking that the lifecycle carbon emissions associated with biodiesel are too high for it to qualify as a low carbon alternative. Even if indirect carbon emissions are ignored, the amount of biodiesel that would have to be blended into petroleum-based fuel to obtain meaningful carbon reductions would require the use of biodiesel in high-percentage blends that would no longer meet ASTM on-road diesel fuel standards.

b. Biodiesel - Operational Challenges

Last year, ASTM-International approved a modification to the on-road diesel fuel standard that will facilitate the use of biodiesel in blends up to five percent (B5). Motor carriers have made enormous investments in heavy duty diesel engines. These engines were designed and built to run on diesel fuel that meets the ASTM D975 fuel specification. Indeed, engine manufacturers require the use of fuel meeting this ASTM D975 standard in order to preserve warranty claims. High percentage blends of biodiesel will not meet the fuel standard that the diesel engines were designed to run on and may create significant operational challenges for end users.

High-percentage blends of biodiesel gel at a higher ambient temperature than petroleum-based diesel and may cause trucks to become stranded in cold weather. Anti-gelling products, heating systems for fuel tanks and blending with No. 1 diesel fuel have been used to prevent gelling, but each of these options adds to operating costs. High-percentage biodiesel blends also can cause a variety of costly engine problems, and are therefore not recommended for use by engine manufacturers. Even if new trucks were designed to accept high percentage blends of biodiesel, the long lifespan of a diesel engine makes high percentage biodiesel blends an unacceptable alternative for the millions of trucks that comprise the existing fleet.

Another operational challenge presented by biodiesel is that it behaves as a solvent and may dislodge sediment that naturally accumulates in truck fuel systems, requiring an unanticipated fuel filter change in advance of regularly scheduled maintenance. This could be a significant issue and cost for over-the-road trucks, which often travel far from their base of operations.

c. **Biodiesel is Expensive**

Biodiesel derived from soy oil is significantly more expensive than petroleum derived diesel fuel. The example provided below demonstrates the difference between the wholesale cost of biodiesel and the wholesale price of ULSD.

The Economics of Biodiesel [2]

Feedstock Costs:	$ 2.99
Soy Oil (7.3 lbs./gal.) @ 38 cents +.03 cents for transport:	
Production Costs:	
Methanol (12%-20% by volume)	$ .10 - .20
Catalyst	$ .10 - .12
Electricity	$ .01
Natural Gas (boiler - heat)	$ .08 - .10
Labor and Overhead	$ .05 - .10
Maintenance	$ .03 - .05
Insurance & Tax	$ .03 - .05
Depreciation	$ .05 - .10
Total Production Costs	**$ 3.44 - $3.72**
Federal Tax Credit (expires 2009)	$ -1.00/ gallon
Wholesale biodiesel (w/o transport)	**$ 2.44 - $2.72 / gallon**

On October 23, 2009, the wholesale price of ULSD was $2.10 per gallon.[3] Even with the $1.00 per gallon federal blending credit applicable to biodiesel, the renewable fuel was still significantly more expensive than the average price of ULSD. Moreover, there is no guarantee that Congress will extend the biodiesel blending credit, which will expire at the end of 2009 unless renewed. If Congress does not act to extend this tax credit, then the cost of biodiesel could be almost double the cost of ULSD.

The price comparison of biodiesel to ULSD shown above is not an anomaly as the price of soybean oil has varied directly with the price of crude oil. Even during the record high diesel prices during the summer of 2008, biodiesel remained more expensive than ULSD.

In addition to the significant cost differential between biodiesel and ULSD, high percentage blends of biodiesel have a lower energy value, requiring more fuel to be purchased to perform an equivalent amount of work.

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[2] Sources: *The Wall Street Journal* (October 23, 2009); and American Trucking Associations.

[3] *The Wall Street Journal* (October 23, 2009).

C. Cap and Trade should not Apply to Transportation Fuels

Should Congress move forward with a cap and trade carbon control system, oil refinery carbon caps should apply only to the refinery's direct carbon emissions and not to the downstream combustion of the products they produce (i.e., gasoline, diesel, jet fuel). Applying a carbon cap to the carbon produced from combusting mobile source fuels is an inefficient way to regulate this emission source and does not distinguish between gasoline whose consumption may be reduced through price incentives and diesel fuel consumed by trucking companies that do not consume diesel on a discretionary basis. Similarly, issuing additional no-cost allowances to refineries to help shield the trucking industry and other non-discretionary consumers of diesel from fuel price increases may not work if refineries choose to use those allowances to subsidize the price of their discretionary products, such as gasoline.

The remainder of our testimony will address other means of reducing carbon emissions from mobile sources, such as the trucking industry.

III. Alternatives for Reducing Carbon Emissions from the Trucking Industry

Trucking is not an industry that chooses to remain on the sideline awaiting new mandates. This is especially true with climate change legislation. That is why ATA undertook a full analysis of our industry and its operations and began its efforts to develop its greenhouse gas reduction plan beginning in 2006 before serious climate debates in Congress even began. The ATA effort took into account the unique nature of the trucking industry and identifies opportunities to reduce its carbon footprint without restricting the delivery of the nation's goods.

The fruits of our industry's efforts culminated in May of 2008 when ATA formally unveiled its sustainability plan entitled *Strategies for Reducing the Trucking Industry's Carbon Footprint.* ATA's bold sustainability program will have an immediate impact on the environment, reducing fuel consumption by 86 billion gallons and reducing the carbon footprint of all vehicles by nearly a billion tons over the next ten years. Our plan can achieve real results with far less cost and disruption to our industry sector than under a cap-and-trade scenario. To view ATA's plan, go to http://www.trucksdeliver.org/pdfs/Campaign_Executive_Summary.pdf.

The recommendations set out solutions for our industry that are achievable today to reduce greenhouse gases. The six key recommendations set out in the report are as follows:

A. Enact a National 65 mph Speed Limit and Govern New Truck Speeds to 65 mph for Trucks Manufactured After 1992

A truck traveling at 75 mph consumes 27 percent more fuel than one going at 65 mph. Bringing speed limits for trucks down to 65 mph would save 2.8 billion gallons of diesel fuel in 10 years and reduce CO_2 emissions by 31.5 million tons. Automobile consumption of gasoline would drop by 8.7 billion gallons, with an accompanying drop in CO_2 emissions of 84.7 million tons. More aggressive enforcement would further reduce fuel consumed and carbon produced.

B. Decrease Idling

Truck drivers idle their trucks out of necessity. The Department of Transportation's Federal Motor Carrier Safety Administration *Hours-of-Service* regulations require mandatory rest periods. As the driver rests in the truck's sleeper compartment, he/she will often need to cool or heat the cab to rest comfortably. In extremely cold weather, truck drivers also will idle their engines to prevent the engine block from freezing. Argonne National Laboratory estimates that the average long-haul truck idles for 1,830 hours per year. With hundreds of thousands of these trucks on the road, idling has a significant impact on fuel consumption and the environment. The U.S. Environmental Protection Agency (EPA) estimates that idling trucks consume approximately 1.1 billion gallons of diesel fuel annually.

Idling in congested traffic, or running the engine to keep the driver warm or cool while resting, annually consumes an estimated 1.1 billion gallons of diesel fuel. Reducing so-called discretionary idling (for truck cab heating, and cooling) can be targeted with new technologies that reduce fuel consumption. Options currently available to fleets to minimize discretionary idling have the potential to reduce CO_2 emissions by an estimated 61.1 million tons over the next ten years

C. Reduce Highway Congestion through Highway Infrastructure Improvements

Americans waste a tremendous amount of fuel sitting in traffic. According to the most recent report on congestion from the Texas Transportation Institute, in 2005, drivers in metropolitan areas wasted 4.2 billion hours sitting in traffic. These congestion delays consumed 2.9 billion gallons of fuel. ATA estimates that if congestion in these areas was ended, 32.2 million tons of carbon would be eliminated and, over a 10-year period, nearly 32 billion gallons of fuel would be saved, reducing carbon emissions by 314 million tons.

ATA recommends that Congress invest in a new congestion reduction program to eliminate major traffic bottlenecks identified in all 437 urban areas across the country, with a specific focus on those that have the greatest impact on truck traffic. Congestion relief offers one of the most viable strategies for reducing carbon emissions. ATA recommends a 20-year plan for addressing congestion. During the first five years, the focus would be on fixing critical highway bottlenecks. During the next five to 15 years, traffic flow in critical freight corridors would be improved through highway capacity expansion. Beyond that, the focus would be on creating truck-only corridors which would enable carriers to run more productive vehicles. These improvements are possible only with dedicated revenue generated by an increased federal fuel tax.

D. Increase Fuel Efficiency through EPA's SmartWay Program

In February 2004, the freight industry and EPA jointly unveiled the SmartWay Transport Partnership, a collaborative voluntary greenhouse gas reduction program designed to increase the energy efficiency and energy security of our country while significantly reducing air pollution in the process. The program's mantra is "fuel not burned equates to emissions not had." Patterned after the highly-successful Energy Star program developed by EPA and DOE, SmartWay creates strong market-based incentives that challenge companies shipping products and freight operations to improve their environmental performance and improve their fuel efficiencies. To become a partner a fleet must commit to reduce fuel consumption through the use of EPA-verified equipment, additives, or programs.

Since its launch in 2004, the SmartWay program has grown to include over 2,000 partners and saved 14 million metric tons of CO_2, 1.4 billion gallons of fuel, and $3.5 billion in fuel costs – the equivalent of taking 3.1 million cars off the road.

SmartWay encompasses the whole freight industry - shippers, truckers, rail carriers, even dealer service centers and truck stops. Program partners reduced fuel consumption in 2008 by over 500 million gallons and SmartWay will help the trucking industry will reduce its CO_2emissions by nearly 300 million tons in 2012. SmartWay is one voluntary greenhouse gas program that not only works, but exceeds expectations.

E. Promote the Use of More Productive Truck Combinations

By reducing the number of trucks needed to move the nation's freight, the trucking industry can lower its fuel consumption and produce significant environmental benefits. More productive equipment - where it is consistent with highway and bridge design and maintenance of safety standards - is an additional tool that should be available to states. ATA estimates that allowing nationwide operation of higher productivity vehicles by increasing single tractor trailer maximum gross vehicle weights to 97,000 pounds and use of heavier double 33-foot trailers would save more than 20.5 billion gallons of diesel fuel and reduce carbon emissions by over 227 million tons over a 10-year period.

A recent study by the American Transportation Research Institute found that use of these vehicles could reduce fuel consumption by 39%, with similar reductions in criteria and greenhouse gas emissions. Increased truck productivity has a proven track record of reducing vehicle miles traveled and fuel consumption on highways such as the New York Thruway, Massachusetts Turnpike, Florida Turnpike, and on roads throughout the Western United States. These examples of responsible governance could be replicated by other states if they are given the necessary flexibility under federal law.

F. Support National Fuel Economy Standards for Medium- and Heavy-Duty Trucks

ATA supports increasing fuel economy standards for commercial medium- and heavy-duty trucks that are technologically and economically feasible, do not compromise truck performance, and provide manufacturers sufficient stability and lead time for production. Given that fuel economy in the industry has remained flat over the last quarter century and fuel now is the largest operating expense for many fleets, it is more critical than ever to ensure small and large fleets alike are able to continue to deliver the nation's goods. ATA is working closely with the U.S. Department of Transportation and the National Academy of Sciences as they work to evaluate fuel economy, fuel efficiency, and the establish associated standards for medium- and heavy-duty trucks as directed under the Energy Information and Security Act of 2007.

Beyond the six aforementioned recommendations and in closing, ATA requests Congress to consider funding research and development in the areas of new engine technologies, aerodynamics, low-carbon fuels, fuel additives, lubricity, tires, batteries, hybrids, anti-idling equipment, insulation, and rolling resistance specific to operations of line-haul trucks. Technology advancements have been stalled for many years and an infusion of funding and will is critical to realize the next generation of more efficient and lower carbon-emitting trucks.

IV. Carbon Taxes on Transportation Fuels

Controlling carbon emissions by taxing those emissions is premised upon the rationale that by increasing the cost of carbon emissions (*e.g.*, fuel consumption) an economic incentive is created to reduce emissions. Carbon taxes can be an efficient economic mechanism to reduce carbon emissions. While it may be difficult to establish the appropriate tax rate that will guarantee a specific carbon reduction, this is not an insurmountable problem.

Carbon taxes on transportation fuels will increase the price of fuel, but will not increase the volatility of fuel prices, as the price of transportation fuels would not be impacted by a carbon derivative market. From the trucking industry's perspective, carbon taxes are a tangible fixed expense that can be quantified and fully or partially passed on to consumers of trucking services.

For a carbon tax to be supported by the trucking industry, the revenue derived from the tax must be allocated to the Highway Trust Fund. Placing this revenue into the Highway Trust Fund has the advantage of further reducing carbon emissions from mobile sources, as these funds could be directed toward projects that mitigate congestion. Revenue from carbon taxes on diesel fuel should be fully dedicated to addressing major bottlenecks on significant highway freight routes. According to the Federal Highway Administration, the nation's worst highway freight bottlenecks caused 226 million hours of truck delays in 2006 alone[4]. The congestion caused by bottlenecks produces unproductive fuel use at a significant environmental and financial cost. The level of carbon tax placed on on-road diesel fuel should not exceed the rate necessary to generate the revenue needed to fund highway freight improvements.

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[4] Cambridge Systematics for the Federal Highway Administration, *Estimated Cost of Freight Involved in Freight Bottlenecks*, Nov. 2008.

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ATA and Hahn Transportation appreciate the opportunity to offer the trucking industry's testimony before this Committee and I look forward to answering any of your questions. Thank you.

ATA
Driving Trucking's Success

American Trucking Associations
410 First Street, SE, 3rd Floor, Washington, DC 20003

November 10, 2009

Senator James Inhofe
United States Senate
c/o Heather Majors
Committee on Environment and Public Works
410 Dirksen Senate Office Building
Washington, DC 20510

via e-mail: Heather_Majors@epw.senate.gov

RE: Response to Follow-Up Questions from October 29, 2009 Testimony of Barbara Windsor, President, Hahn Transportation, and American Trucking Associations First Vice Chairman.

Dear Senator Inhofe:

Thank you for the opportunity to testify before the Committee on Environment and Public Works' recent hearing entitled *Legislative Hearing on S. 1733, Clean Energy Jobs and American Power Act.* This letter responds to your specific request below for additional information and represents the positions supported by the American Trucking Associations (ATA).

1. **In addition to the price increases in diesel and gasoline that will occur by design under a cap-and-trade scheme, the Kerry-Boxer bill also requires States and major metropolitan areas to use the transportation planning process to reduce emissions. The bill, as well as some testimony we've heard today, seems to be based on the idea that one way we should reduce transportation-related emissions is by reducing vehicle miles traveled. I have serious concerns with that philosophy, not least because total travel is highly correlated with GDP. Could you tell me what impact a move to reduce vehicle miles traveled would have on your company or the trucking industry generally?**

Senator Inhofe, I concur with your concerns about attempts to reduce vehicle miles traveled by trucks. Trucking is not a discretionary user of fuel. Trucking freight volumes, which primarily influence our miles driven, are closely correlated to the gross domestic product and the Nation's economic activity. Any attempts to curtail truck VMT through punitive measures, or by reducing the efficiency of the highway system, are likely to succeed only if the increase in freight transportation costs that are the inevitable result cause economic stagnation and job losses. Senator, the trucking industry is highly competitive, and the free market is driving a relentless push by carriers to reduce their costs, including through efficiency improvements that, among other things, cut down on the number of empty miles traveled by trucks. This is happening without government involvement.

There is, however, one way to address trucking's fuel consumption and carbon footprint: productivity improvements. During the upcoming authorization of surface transportation legislation, Congress will have an opportunity to assist the industry's efforts to reduce our VMT while lowering transportation costs and improving highway safety. By authorizing states to expand the use of larger and/or heavier trucks, the industry can move the nation's freight more safely and more efficiently while putting fewer miles and fewer trucks on the road. This is the only practical way to achieve significant reductions in truck VMT without putting the health of our industry or the economy at risk.

2. In your testimony you mentioned the costs to your business of mandates. Could you quantify in cents per gallon how much government mandates cost you? Will S. 1733 increase or decrease these costs?

The trucking industry is concerned over what further government mandates under S. 1733 will do to fleets. While it is difficult to quantify cost increases in "cents per gallon" attributed to all government mandates, I will discuss recent cost increases to the trucking industry that resulted from government diesel engine and fuel mandates.

Federal Engine Standards – EPA's diesel engine emission standards have significantly increased the cost of new diesel engines. Due to the variability in miles traveled each year by trucks in different segments of this very diverse industry, it is not possible to provide accurate data on a per gallon basis. For instance, new diesel engine emission standards imposed by the U.S. Environmental Protection Agency (EPA) in 2002 drove up engine costs by $3,000 to $5,000, while decreasing fuel economy between 6-8 percent. Additional EPA diesel engine emission standards in 2007 drove up the cost of engines by $8,000 to $10,000 and, by many accounts, decreased fuel economy between 2-4 percent. Diesel engine emission standards set to take effect in 2010 will again increase new engine costs by $8,000 to $9,600. In short, in over a mere 8-year period, truck engine prices will have increased an incredible $19,000 to $24,400 as a direct result of federal environmental mandates. While this is not typically translated into a per gallon fuel cost increase, if you assume that the useful life of a diesel truck is about 1.5 million miles and trucks are getting about 6.5 miles per gallon, then these new engine standards have added about 11 cents per gallon.

We note that S.1733 will further increase the cost of new trucks as steel, aluminum, rubber and other energy intensive materials, as these energy intensive industries are forced to purchase carbon allowances and this additional cost is passed on to the truck manufacturers.

Federal Fuel Standards – In 2006, EPA mandated the transition to ultra low sulfur diesel (ULSD), reducing on road diesel sulfur content from 500 parts per million (ppm) to no more than 15 ppm. While the volatility of fuel prices and the gradual transition to ULSD makes it difficult to know with certainty how much this environmental mandate increased the cost of diesel fuel, EPA estimated that this transition added about 5 cents a gallon.

S. 1733 will most certainly increase the costs of transportation fuels. There are numerous estimates of the costs associated with an economy-wide cap and trade program. Using EPA's own estimates of the price of carbon allowances, we believe that S. 1733 will increase the price of diesel fuel by 16 to 30 cents per gallon in 2015 and 20 to 37 cents per gallon in 2020. The methodology for these estimates is explained in more detail below.

EPA's analysis forecasts a carbon price of $13 - $24 per ton of CO2 equivalent in 2015. EPA's estimate of the lifecycle carbon emissions associated with one gallon of diesel fuel is 27.1 pounds. Since one carbon allowance is equivalent to a metric ton, refineries will need to purchase one carbon allowance for every 81 gallons of diesel they sell (2205 pounds in a metric ton, divided by 27.1 pounds of carbon per gallon of diesel). If an allowance sells for $13 - $24 per ton, then the cap and trade program will increase the price of a gallon of diesel by 16 to 30 cents per gallon. If EPA is correct and the price of carbon in 2020 ranges from $16 to $30 per ton, the cost of diesel will increase by 20 to 37 cents per gallon.[1]

In an industry that consumes 39 billion gallons of diesel fuel where each penny increase in the price of diesel translates to an extra $391 million in cost for the industry, even EPA's lowest estimate of a 16 cent increase in the price of diesel translates into a $6.24 billion tax on our industry. A 30 cent increase in diesel prices amounts to an $11.7 billion tax on our industry and a 37 cent increase in diesel prices amounts to a $14.4 billion tax on trucking

My company consumes 2,500 gallons of diesel per day or approximately 900,000 gallons per year. A 16 cent increase in the price of diesel will cost my company an extra $144,000 per year and a 30 cent increase equates to $270,000 per year. This added expense affects my bottom line and may prevent me from retiring older trucks and replacing them with newer trucks that emit less diesel pollutants

Before leaving the topic of federal fuel mandates, I note that Congress' decision to mandate the use of biodiesel as part of the Renewable Fuel Standard, also adds significant costs to the average price of diesel fuel consumed in this country, as biodiesel is significantly more expensive than diesel fuel. I refer you back to our written testimony for a more complete discussion on the costs associated with the biodiesel mandate. I also note that Congress' decision to avoid preempting California's boutique diesel fuel mandate and various state renewable fuels mandates further increases the price of diesel fuel consumed in those geographic regions where these boutique fuels are mandated.

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[1] There is a genuine concern that refineries will increase the price of diesel by more than the actual carbon allowance costs, so that they can avoid increasing the price of gasoline. Since there are numerous alternatives for passenger cars that run on gasoline (*i.e.*, purchase smaller vehicles, purchase hybrid vehicles, avoid discretionary trips, increase carpooling, and increase the use of buses and subways), refineries will try to limit the gasoline price increase to avoid losing customers. Since trucking consumes diesel on a non-discretionary basis and does not currently have viable alternatives to diesel, refineries may allocate more of the carbon allowance expense to diesel fuel and effectively subsidize the price of gasoline.

Trucking is a highly competitive industry with very low profit margins. This explains why many trucking companies are reporting that as diesel fuel prices increase, profits are greatly suppressed, if they are making a profit at all. Our industry can not absorb rapid increases in diesel fuel costs. That is why the trucking industry is extremely sensitive to how S. 1733 will further escalate diesel fuel prices.

On behalf of ATA and Hahn Transportation, thank you for the opportunity to provide information to the Committee on this issue of significant importance to the nation's trucking industry. If you have any questions concerning these responses, please contact Rich Moskowitz, ATA's Vice President and Energy Counsel at 703-838-1910 or RMoskowitz@trucking.org.

Respectfully submitted,

Barbara Windsor, President, Hahn Transportation,
and American Trucking Associations' First Vice
President

Senator INHOFE. Thank you very much.

And Ms. Windsor, I had not read your statement that you had submitted, but I heard you say a few things here that I would like quantified a little bit differently. And I don't mean right now, but for the record, it would be helpful to me if you would take these things—you mentioned three things that have happened, mandates, I would say, that have come from the EPA or from us. I would like to see how that translates into fuel costs.

You said that, you know, you don't object to increasing the money that would go into the Highway Trust Fund, the cost of fuel. But these other things, I would like to have just for my own information how that compares to what maybe a 10 cent increase would be. In other words, give me something to show how many cents a gallon of diesel these things mean to you, how that would translate. So if you would look into that and see if you can do it.

Well, we keep hearing that this is a bill that is going to create jobs. You have made it very clear that you have had a reduction in jobs, and you have had problems in your industry. And I would only say that we get testimony after testimony, everyone is supposed to be creating all these jobs, but it never happens in the industries that are in front of us.

So have you estimated anything in terms of how many jobs would be destroyed in the trucking industry?

Ms. WINDSOR. Currently, the freight market is very soft, so obviously our jobs are at a reduced part. If in fact, we have to add additional costs for diesel fuel, I think we would have a decline in jobs versus an increase in positions.

Senator INHOFE. OK, let me ask it a little bit differently then. Senator Bond issued a report that the Waxman-Markey bill, and this would be about the same, we think, would have the effect of a $3.6 trillion gas tax increase. Now, we all know that most of these taxes are going to be passed on. Would you say that in terms of the consumers out there depend on trucks to deliver goods all over the country, as to how much of that $3.6 trillion do you think would ultimately have to be passed on to the ultimate consumer?

Ms. WINDSOR. It would be very difficult to estimate at this time. I can get back with you on that. But ultimately, the consumer does pay for any increases. We are currently not able to pass on all our additional fuel costs to our consumers, though, especially with the soft freight market at this time.

Senator INHOFE. And you have heard me say this before. One of the things that I find most offensive about the debate that has been going on. People are concerned about our reliance upon foreign countries for our oil and gas. And yet, while we have the greatest reserves of any country right here in the United States, 83 percent cannot be developed because of the bureaucracy. And that is an area that I think would benefit you equally if we were able to go out and just exploit our own resources.

Sherry, you said something in your statement here, talking about cap and trade is far preferable to the command and control approach of the EPA. Well, we are concerned about that. We are concerned about the Clean Air Act and how the EPA could impose these things. And yet there is not a preemption in this bill. In other words, you are supporting the bill, but if you are successful and you had your way and we passed a bill, you would have that to operate under, but also you would still have the EPA. There is no preemption.

Are you going to try to encourage a preemption if we get to the point where we are looking at——

Mr. BOEHLERT. Senator, if I were running the show, and I could have my druthers, I would pass this retroactively. I think you need a partnership between the executive and the legislative branch, but I think it is far preferable to have the legislative branch address this problem in a meaningful way. And that is why I applaud these hearings.

The worst possible scenario is inaction, no one doing anything. Global climate change is so serious, and it is so negatively impacting each and every American of all persuasions that it would be sinful to do nothing.

Senator INHOFE. OK. That is not the question. The question is, do you support preemption?

Mr. BOEHLERT. No. Oh, do I support preemption?

Senator INHOFE. Yes.

Mr. BOEHLERT. You mean, the Feds?

Senator INHOFE. Yes. If we were to pass something here, do you want that to preempt the EPA's regulations doing essentially the same thing or something that could be worse?

Mr. BOEHLERT. Yes. The answer would be yes to that.

Senator INHOFE. OK. Very good. Thank you very much.

Thank you, Madam Chairman, for letting me go first.

Senator BOXER. Thank you so very much.

Senator Lautenberg goes first, and Senator Carper will go next. Go ahead, Senator Lautenberg.

Senator LAUTENBERG. I yield to Senator Carper.

Senator BOXER. Senator Carper will go first, then Lautenberg.

Senator CARPER. No, I don't want to go first.

[Laughter.]

Senator CARPER. No, I do. I am delighted to go first, and I thank my colleague for letting me go first.

Congressman Boehlert, Sherry, it is just great to see you, and to each of our other witnesses, thank you so much. Some of you are from a long way, and we are delighted that you are here. And thank you for excellent testimony, actually.

I will start off, if I could, with Congressman Boehlert. And say how pleased we are to say that you have spent some time in our State, and I think your daughter is there, and it is just great to see you here as well.

The existing funding for our Nation's transportation system is largely through stovepipes, and you know, we focus on building separate types of projects such as highways. We focus on transit systems, but we are really not focused much on national outcomes.

And at my request, and a number of my colleagues', the Kerry-Boxer bill includes a mode neutral grant program—several of you have commented on that today—at the Department of Transportation that is designed to reward States, to reward regions that strive for the greatest reductions in transportation emissions.

Let me just ask, if I could to start with, do you believe this grant program will foster innovation? And second, do you believe it provides local communities with the flexibility that they need to accomplish national goals of reducing transportation emissions?

Mr. BOEHLERT. The answer is yes and yes, and the creative genius of America welcomes incentives. And when the incentives are there, as this bill provides, Katie bar the door. It is unlimited in what you can get from that. So I think it is extremely important.

Second, I think it is extremely important that we allow State and local governments flexibility. We have established broad national goals, objectives that we want to achieve, but we shouldn't mandate every step of the way what State and local government should bring to the table because each and every situation is different. But as long as they develop plans going forward, working across jurisdictional lines, that advance toward the objectives and goals of the overall bill, we are all the beneficiaries.

Senator CARPER. Good. Thank you. Let me just have a follow up question.

I want to thank our Chair for including in the mark the 3 percent allowance to go to transportation strategies, to reduce our greenhouse gas emissions. And I thank you especially for scheduling this panel to be before us today.

But the allowances, I think, will generate up to $3 billion annually, split evenly, I believe, between transit funding and mode neutral grant programs. And I would just ask, do you believe this level of investment is sufficient to address transportation's contributions to greenhouse gas emissions? Do you believe it is sufficient by itself?

Mr. BOEHLERT. It is an important step forward, and I applaud when you take that first step toward a goal. Obviously, we would like more; 33 percent and 3 percent, there is a big gap there. But it is an important first step, and I applaud that, and we will be glad to work with you to accomplish even more.

Senator CARPER. All right. Thank you.

Mr. Millar, a follow up question to that. How important are the allowances that are provided in the Chair's mark to reduce transportation emissions? And what role, if any, do you think that inner city passenger rail could play in these efforts?

Mr. MILLAR. We believe the allowances are essential. The benefit of remissions reduction that public transportation provides is when people use public transportation. If, as the economic analysis shows, some of the cost of fuel—we believe it will be a modest cost increase, but still a cost increase of fuel that will occur, that is expenses that the transit systems have to absorb. If they have to raise fares, if they have to reduce service, then the benefits of having people choose to use public transit will be greatly lessened. So we think these are essential that these allotments go toward transit.

With regard to improvements to our rail transportation system and network across the country, we think that that is something that out of the planning programs, States can determine what are the efficient investments there. We think the competitive grant program is the right place to get some of that. But we think that in all likelihood the size of those investments will require additional funding to really make them pay off. But as Congressman

Boehlert just said, that first step is the most important and we appreciate the work in this bill.

Senator CARPER. Thank you.

And in conclusion, a quick question for Mr. McKeever. Again, congratulations on the great work you are doing out there and for your leadership, but you have State and local funding restraints. Could Sacramento have completed the kind of integrated planning process that you have described without Federal funds?

Mr. MCKEEVER. Well, we did use our traditional Federal funding to fund a portion of that project, but we also had specialized funding both locally and from the State.

Senator CARPER. And do you believe the allowance revenue that is dedicated to transportation under the Kerry-Boxer bill is sufficient for all regions to complete a similar planning process?

Mr. MCKEEVER. Well, again, I think on the planning side, I think it is a very important step in the right direction. I think we are going to have to get some good treatment on the transportation bill side in order to pull it all together.

Senator CARPER. All right. Thanks.

Ms. Windsor, I don't have time to ask you my question, but I am delighted you are here. We thank you very, very much for your testimony.

Senator BOXER. And Senator, if you wish to include it in the record, then she can answer it in the next 24 hours.

Also, I just have to say, Senator Carper is thanking me. It was Senator Carper, Senator Lautenberg, Senator Cardin, Senator Specter. It was just a tremendous number of people who worked to make sure we did the most we could. It is very difficult, because it is a zero sum game. You take allowances and put them in one place, you have to take them from another place. And believe me when I say Senator Carper would have liked it a little higher.

Senator Lautenberg.

Senator LAUTENBERG. Thanks, Madam Chairman.

I defer to Senator Carper because he has worked so diligently on this section of the bill. And we have common views in terms of transportation. Our States are neighbors, and we get a lot more traffic than the number of people just living in our States, that is for sure.

Mr. Boehlert, if we can move more freight movement to rail, there are all kinds of benefits that ensue.

And Ms. Windsor, don't be afraid. I am not going to say take trucks off the road alongside.

But how would that help us? What do you see as the principal values of moving more of the freight by rail?

Mr. BOEHLERT. First of all, I have long appreciated both modes of transportation. I want you to know that. But rail is more environmentally friendly, less emissions, obviously. And it is more energy efficient in many respects, lessening our dependence on foreign oil.

But the key point this overall report of the Bipartisan Commission makes is that we should not go in with any prejudices. It is not what I like or you like or the next person likes. It should be mode neutral. So you have these broad national objectives and goals you are trying to achieve, and each one of them should be addressed individually as you determine where you are going to make the investments in our transportation infrastructure for the future.

Senator LAUTENBERG. Mr. Millar, Amtrak, for instance, which is a major focus of mine, not to prejudice your thinking, I promise, but it is a lot more efficient than airplanes, 24 percent more efficient than automobiles.

So it sounds like we are delinquent in the investments that we have made in rail service. And what I am looking for is your view and confirmation of what we have seen. We had the opportunity in the last couple of days to talk to people from the E.U., members of the Parliament, and we discussed their investments, for instance, Germany, France, Italy, Spain, they make us look like a third world country. So what do we do about the national investment in passenger rail service?

And I fought like the devil, and we got $13 billion over the next 5 years reauthorized for investments in Amtrak. We got an $8 billion program for high speed rail investments throughout the country. Where do you think we ought to go to get even more invested in passenger rail service than we have?

Mr. MILLAR. First, sir, let me thank you for your leadership over many, many years on this issue and on public transportation issues. We admire your expertise and appreciate your fortitude in moving forward.

There is no doubt about it. The U.S. is a third world country, maybe even a fourth world country, if that is possible, when it comes to passenger rail. We simply have refused to make the kind of investments that our competitors and our future competitors have been and are making at the moment. The President's support in the stimulus package and the concurrence of the Congress was an important first step, but a very tiny first step.

Most Americans don't really know what good train service is anymore, unless they have traveled to Japan or some other country. And I think what is going to happen here, it is going to be a little like good roads were in the 1930s and 1940s. We built a few of them, and people said, hey, we need more and better roads, and surely we did. And we built the world's greatest road system. I think the same thing has to happen with intercity rail, and particularly high speed rail. I think Americans, when they get a sample of something that is that good and that useful and that efficient, they will demand more.

As to the funding package, it is going to take a solid effort by the Congress to figure that one out. And whether it is bits and pieces that are all put together to make enough, or whether we can come up with a genius approach such as was done with the interstate highway system, I don't know. But we stand ready to work with the Congress on that. We need to make that commitment.

Senator LAUTENBERG. Thank you. I thought I had a coup d'etat here and the Chair was empty, so I will just continue for a moment or more.

[Laughter.]

Senator BOXER. You have that right.

Senator LAUTENBERG. That is very kind.

Senator BOXER. After all you have done for transportation in this Nation, they even named a train station after you, for God's sake.

[Laughter.]

Senator LAUTENBERG. We don't talk about that.

[Laughter.]

Senator BOXER. Take me to Lautenberg Station.

Senator LAUTENBERG. I had to leave the Senate. You know, it is bad form to have things named for you while you are a sitting Member of the Senate or a sitting Member. So I left for 2 years. I got a railroad station, a courthouse and a vocational school. And then I said, OK, back.

[Laughter.]

Senator LAUTENBERG. So here we are. It was a nice tribute that the people of New Jersey gave me.

Ms. Windsor, one of the things, and I admire the fact that you are here representing a family established company.

Ms. WINDSOR. Thank you.

Senator LAUTENBERG. And I had the privilege in my lifetime of establishing a company, but not family. And so every year, we see 5,000 people killed in crashes involving large trucks. But in your testimony, you call for larger trucks, increasing the size and weight of large trucks. What is the justification? I mean, it takes longer to stop these vehicles. There is a question about wear and tear on the roads, the infrastructure that we built for traffic, and had no concept of what the volume of this traffic might be, nor the kinds of opportunities there were for moving goods and people.

So what do we do with more large trucks? I have not been a friend of increasing truck size, as you may know. It doesn't mean we are not friends.

Ms. WINDSOR. Right.

Senator LAUTENBERG. But could you give us an explanation of the validity of doing that?

Ms. WINDSOR. Well, obviously, one of the issues is productivity of the equipment that we currently have without adding additional tractors and trailers on the highways. Many of our units that we run now are not fully loaded because of weight restrictions.

As we see the next generation of safety items that have become available to us, and our tractors that we now have with all the emission devices, the equipment is now becoming heavier and heavier. Our fuels are heavier. Our tractors are heavier. And again, if we add additional safety devices that we all would like to have on our equipment, we are increasing the weight of the equipment.

By giving us a tolerance above our 80,000 pounds, then we know that we will not have as many tractors and trailers on the highway.

Senator LAUTENBERG. Fifty-three feet?

Ms. WINDSOR. Yes, we do run 53.

Senator LAUTENBERG. Are you advocating triples?

Ms. WINDSOR. In the areas where they can be run. Obviously, not around the capital beltway.

Senator LAUTENBERG. All right. We run into opposition here on this because I think we have to resort to what is the safest, best way to do it. And there are lots of places where trucks and trucks only can carry it, and we have to provide investments there as well. So thank you very much.

Senator BOXER. Well, transportation safety is something that, Senator, you are my leader on that.

If I could just ask unanimous consent to place into the record a statement by the American Bus Association, and we thank them for giving us their insight.

Again to this panel, we thank you. I am not going to burden you with questions. If I have a burning question, I will put it in writing and ask that you get it back to us ASAP. Your testimony is very, very helpful, and very clear.

And you know, I just think it is a patriotic duty that you performed really well today, coming all the way from places near and far. Thank you very much.

We stand adjourned. We will be back at 2:15 sharp to start the third panel, and we are going to continue on until the evening until we are done with these hearings.

Thank you very much. See you later.

[Recess.]

[The referenced statement follows:]

United States Senate
Committee on Environment and Public Works
Hearing
On
S. 1733
Clean Energy Jobs and American Power Act
Testimony of the American Bus Association

Chairman Boxer and members of the Committee, the American Bus Association is the premier trade association of the private over the road bus industry. The ABA represents 850 bus operator members who are engaged in providing transportation services and 3000 other association members who provide lodging, food, sightseeing services for the nation. We appreciate the opportunity to testify on this important subject and want to convey our gratitude to you Chairman Boxer for your leadership in crafting this bill with Senator Kerry and sheparding it to this point in the Senate.

The reduction of greenhouse gases (GHG) and the reduction of the congestion on the nation's highways must be a national priority. At the same time, the fostering of "green" transportation alternatives is also of crucial importance to us all. The ABA's message is that the private bus and motorcoach industry can be a partner to you in these endeavors and that thanks to your farsighted inclusion of the private bus industry in your legislation we will be a partner to you.

Thus, ABA thanks you and supports your inclusion of intercity bus projects as one of the eligible strategies for Metropolitan Planning Organizations (MPOs) and states to consider as part of their greenhouse gas emission (GGE) reduction plans. Plans that will be funded with emissions allowances.

As noted above, the ABA is the trade association for the private over the road bus industry. Our operator members provide all manner of transportation services, from scheduled line haul service, charter and tour, commuter service and airport shuttle service. As a result, the private bus industry provides approximately 750 million passenger trips every year, about the same number provided by the U.S. domestic airlines. In addition, we provide as much service in two weeks as Amtrak does in a year. Moreover, our membership operates nationwide. ABA member Peter Pan Bus Lines provides both charter and scheduled service in the northeast. Academy Bus Lines provides commuter service into New York City; several ABA members provide all these services in the States around Ohio and Pennsylvania; Jefferson Lines operates similar service out of Minnesota and into States as far south as Arkansas; Rimrock Stages operates in the Plains States and ABA member Greyhound Lines provides nationwide scheduled service and Coach America operates charter service nationwide with a particular emphasis in the far Western states.

While the operations of the private motorcoach industry are extensive, its carbon footprint is not. First, in the matter of congestion mitigation, our ability to take up to fifty five automobiles with one motorcoach is well known. The industry's ability to continue to operate when inclement weather has shut down an airport or a faulty signal has kept Amtrak in the station is also well documented. What is less well known but is vital for purposes of this legislation is the private bus and motorcoach industry's ability to provide service without any harm to the nation's environment.

The Union of Concerned Scientists (UCS) recently released a report entitled "Getting There Greener: The Guide to Your Lower-Carbon Vacation." The report grouped travel options for solo travelers and families from the "greenest" to the worst. Motorcoach transportation ranked as the "greenest" option for trips from one hundred miles to over one thousand miles for each family group or solo traveler.

The UCS report noted that the carbon footprint for motorcoach travel is the smallest of any of the modes of transportation. For example, 65 pounds of CO2 is emitted by a family of four in a motorcoach. This figure may be contrasted with 170 pounds of CO2 emitted via train; 120 pounds in a car (with a fuel economy of 23 mpg) and 305 pounds of CO2 emitted from an airplane. For the same family traveling 2,500 miles the comparable amount of pounds of CO2 emitted are 1680 in a motorcoach; 4,300 in a train; 3,020 in a car and 3,705 in an airplane.

The UCS report is on par with research sponsored by the ABA Foundation and prepared by M.J. Bradley and Associates. This report, completed in October of 2008 demonstrates that motorcoaches are the transportation mode with the greatest fuel economy. A motorcoach will yield over two hundred passenger miles per gallon of fuel. Amtrak provides just over 150 passenger miles per gallon and a private automobile will yield less than fifty passenger miles per gallon as does a domestic airline trip. Finally, the M.J. Bradley report states that on average, Motorcoaches use the least amount of energy and produce the lowest carbon dioxide emissions per passenger mile of any of the fourteen transportation modes analyzed.

Given all of this information there can be no doubt in the motorcoach industry's ability to be a part of the solution to the transportation issues that face the nation. And we appreciate your confidence in our industry with your inclusion of the private bus and motorcoach industry within S. 1733. However, there are ways in which our participation in the legislation can be made stronger to the benefit of all.

Perhaps most importantly, Section 114 of the bill sets up the Smartway Transportation Efficiency Program to develop measurement protocols to evaluate the energy consumption and greenhouse gas impacts "for passenger transport and good movement" and to establish thresholds for certifying or designating energy-efficient, low greenhouse gas technologies and strategies "for each mode of passenger transportation and goods movement." This section then establishes a Smartway Transport Freight Partnership and a methodology for improving freight greenhouse gas performance data bases as the means to carry out the general duties of this section. But the provision is silent with regard to the means to carry out these duties with regard to passenger carriers.

Frankly there must be some passenger carrier guidance. This guidance should require EPA to compile data on the energy efficiency and greenhouse gas performance of buses as well as trucks. The main reason the public and decision makers do not understand the energy and GGE benefits of buses is the paucity of published data. Broadening this provision to include data on both trucks and buses would fix that problem.

This guidance should also direct EPA to establish a commercial passenger program similar to the Smartway Freight Partnership established in section 822 (c). The program should encompass at least the three many commercial passenger transportation modes – bus, air, and rail. The program should include the development of accurate measurement of the energy and GGE performance of the various passenger modes; the publication of that information to the public in a usable format; and incentives and recognition for carriers who meet high energy efficiency and GGE standards.

The importance of including passenger carriers within the Smartway Program is belied by the few changes needed to ensure this result. Indeed, only half dozen changes to the bill are required.

First, intercity bus projects are listed in the bill as one of the eligible strategies for MPO's and States to consider as a part of their Greenhouse Gas Emission (GGE) reduction plans, plans that will be funded with emission allowances. However, it is not clear that intercity buses and facilities owned and/or operated by private entities are eligible. Without this clarification, intercity bus projects, along with other categories such as freight rail projects would be jeopardized. To accomplish this change the words: "private transportation providers or" should be inserted after "to" on page 77, line 22 of the Chairman's Mark.

Secondly, on page 78, line 7, the following language should be added: "(4) Surface Transportation Program Clarification – Section 133(b) (2) is amended by striking "including" and adding "and" before "vehicles"". This technical correction in 23 USC 133(b)(2) is needed in order to ensure the continuance of intercity bus project eligibility for Surface Transportation Program funding, which could influence intercity bus eligibility under the climate change bill. Section 133(b)(2) provides that STP funds can be used for "capital cost for transit project eligible for assistance under chapter 53 of title 49, including vehicles and facilities, whether publicly or privately owned, that are used to provide intercity passenger service by bus". SAFETEA-LU subsequently defined "public transportation" in title 49 as excluding intercity bus service. Since "public transportation and “transit” are interchangeable, the 23 USC 133(b)(2) intercity bus language eligibility language is arguably rendered meaningless, which ABA is sure was not intended.

Third, the Smartway Transportation Efficiency Program established in Section 114 included a Smartway Financing Program for implementation of low-greenhouse gas technologies or strategies. The Financing Program appears to apply to both passenger and freight transportation entities, but that should be clarified since the Financing Program follows immediately after the Smartway Freight Program in the text. This clarification is easily done by adding “passenger and freight” after “the” on line 24 of page 81.

Fourth, the bill describes the process by which the GGE reduction plans are coordinated by and consulted with public agencies. ABA believes that there should be a requirement that these plans also benefit from consultation with private transportation providers. Too often, private transportation providers are not consulted or are contacted as an afterthought when transportation services and facilities are discussed. The private operators bring a unique and needed perspective to any consultation process and that perspective can benefit all. ABA urges that private operators be given a seat at the table from the beginning of any planning process. This change may be accomplished by adding “(iv) in consultation with private transportation providers” on line 11 of page 62 and line 1 of page 70.

Fifth, the bill does note that heavy duty vehicles are eligible for clean vehicle technology. However, the bill does not expressly state that intercity, over-the-road buses are eligible for such technologies. Clarification is needed that the program for advanced technology and hybrid medium and heavy duty vehicles includes over-the-road buses.

OTRBs generally would be considered heavy duty vehicles, but since transit vehicles are specifically referred to and the language does not include OTRBs, it is important to refer specifically to OTRBs in order to avoid any question about their eligibility.

Finally, Section 5311(f) sets aside 15% of the section 5311 rural transit funds for rural intercity bus services. The language on page 923 seems clear since this set-aside is part of the formula and conditions governing grants under section 5311. However, since the heading at the top of page 923 is entitled "Distribution of Public Transportation Grants" and intercity bus service is not part of the definition of "public transportation"; clarification is needed in order to avoid any confusion about the applicability of section 5311(f). In order to eliminate this confusion we recommend that the words: ", including section 5311(f)" be added after the word: "Code" on line 21 of page 923.

The American Bus Association and its 3500 members appreciate this opportunity to present our views and suggested changes on this vital and far seeing legislation. The private over-the-road bus industry is, as detailed above, the most ecologically sound mode of transportation available. And we are becoming "greener". Indeed on the newer model motorcoaches, the air expelled from the bus is cleaner than the air taken in. The private bus industry is also becoming the mode of choice of legions of riders in these lean economic times. It is clear to ABA and its members that making a place for the private bus industry at the table when clean air is the topic makes ecological, economic and transportation sense.

Respectfully submitted,

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October 27, 2009

Senator BOXER. The committee will come to order. We are back for our third panel of very distinguished speakers all, and we are very grateful to you for taking the time out of your hectic lives to be here with us.

We are not going to make any opening statements here, which should be good news to you since it usually takes a long time. We are going to right ahead, and we are going to start.

This panel deals with actions in other countries, and we are going to hear from those folks who are really involved in this and who know it, to share your wisdom with us.

We will start with John Podesta, who is President and Chief Executive Officer of the Center for American Progress. It is a think tank he formed in 2003, and of course, prior to that he served as White House Chief of Staff to President Clinton. He has a number of very interesting parts of his bio that I don't have time to share, but will you proceed, Mr. Podesta?

STATEMENT OF JOHN PODESTA, PRESIDENT AND CHIEF EXECUTIVE OFFICER, CENTER FOR AMERICAN PROGRESS ACTION FUND

Mr. PODESTA. Thank you, Madam Chairman and Senator Inhofe. Thank you for inviting me to testify before you. I know you have a lot of witnesses. I have a long written statement that you have included in the record. So let me just make a few points.

First, in my view, we are losing valuable ground to our competitors every day that we do not take action. Our economic competitors are embracing the future, investing in new economic, energy and environmental opportunities to capture the clean energy technology edge, grow their domestic clean energy markets, expand new employment opportunities, and increase production of secure domestic renewable energy.

The real threat to U.S. competitiveness is not in embracing the future, but being stuck in the 20th century energy systems. For example, China is spending 34 percent of its stimulus dollars, $586 billion it is spending on stimulus on clean energy and clean energy infrastructure, nearly twice what the United States is spending, second only in percentage terms to South Korea.

Between now and 2011, they are investing $300 billion in the largest railway expansion in the world. I recently traveled from Beijing to Tianjin, going 250 miles an hour on their new intercity high speed rail service. They own 40 percent of the solar PV production market, almost the same share the U.S. had in 1995. Now, we are under 10 percent.

Germany has the world's largest installed capacity of solar photovoltaic panels and second largest amount of wind power. The renewable energy sector now employs 280,000 people. It is estimated to grow to 500,000 by 2020.

Spain is conquering the intermittency problem associated with renewable energy and generates about a quarter of its electricity through renewable resources, about 8 times more than the United States. It is on track to generate 40 percent of its electricity from renewables by 2020 by investing in a state of the art national smart grid.

And even India is investing $20 billion to expand their solar capacity to 20 gigawatts by 2020, 4 gigawatts more than the total worldwide solar capacity installed today.

Passing the Clean Energy Jobs Act would signal to the world that the United States will seize the defining economic opportunity of the 21st century. This bill can unleash a tidal wave of innovation here at home and draw on America's proven ingenuity and entrepreneurial spirit to build new businesses and to lead the world in clean energy technologies and practices, just as we have in info tech and telecommunications, but we must take action now.

My second point is that the Clean Energy Jobs Act would put people back to work. Reputable, sophisticated economic models all show that comprehensive clean energy legislation is the pathway to creating millions of new jobs at a time when we need them the most. My colleague, Kate Gordon, testified before you yesterday, so I won't go into detail but only note that a study we commissioned from the Political Economic Research Institute at the University of Massachusetts used economic modeling to determine that the clean energy job creation impact of the House version of this legislation plus the stimulus bill that was passed earlier this year would generate $150 billion per year in new clean energy investments in the United States over the next decade, most of that dominated by private sector investments, and would generate 1.7 million jobs.

Finally, I would just like to underscore the need to include several key elements in any future package to create a green economy and put the U.S. on track for long-term sustainable economic growth. I would urge the inclusion of a Clean Energy Deployment Administration, a so-called green bank, to open credit markets and motivate businesses to invest in clean energy technologies that could create some new financing tools to stimulate private sector investment. We have seen Germany and Canada take that step to good effect. Senator Bingaman has that feature in his legislation, and I urge its inclusion in a final package.

I would also urge more emphasis on efficiency and retrofitting building stocks. I think this bill takes a giant step down that path, but we, along with the Energy Future Coalition, released a report arguing that 40 percent of U.S. building stock could be retrofitted at great savings for consumers and commercial building owners and create 600,000 jobs in the process. And we have some ideas about how to get that done.

I applaud the inclusion of strong tropical deforestation provisions in this bill. I recently completed a bi-partisan study with your former colleague, Senator Linc Chafee, and we put forward some ideas about how to strengthen and build that program out. Most of those are probably applicable to implementation on the executive branch side, but we urge you to consider those.

And finally, the clean energy bill has provisions that would expand the use of natural gas. We think more could be done. My testimony goes into that in some detail, but I would definitely urge the inclusion of the Nat Gas Act, which uses natural gas to power particularly heavy duty trucks and fleet vehicles.

Thank you.

[The prepared statement of Mr. Podesta follows:]

Center for American Progress Action Fund

Written testimony for the
Senate Committee on Environment and Public Works

Legislative Hearing on Clean Energy Jobs and American Power Act, S. 1733

October 29, 2009

By
John D. Podesta
President and CEO
Center for American Progress Action Fund

Introduction

Madam Chairman and members of the committee, thank you for inviting me to testify before you this afternoon. I am very pleased to have this time to share my thoughts on the Clean Energy Jobs and American Power Act, S. 1733, and its power to boost our economy's competitiveness.

The Senate global warming debate has focused on pollution limits and timetables, carbon markets and allocations. But we have lost sight of our principal objective: building a robust and prosperous clean energy economy. Moving beyond fossil fuel pollution will involve exciting work, new opportunities, new products and innovation, and stronger communities. Our current national discussion about constraints, limits, and the costs of transition overshadows the economic opportunity of clean energy investments. It is as if, on the cusp of the Internet and telecommunications revolution, debate centered only on the cost of digging trenches to lay fiber optic cable.

Many of our economic competitors see investments in clean energy technologies as key to their long-term sustainable economic growth. Germany, Spain, Japan, China, and even India are building the foundation for a prosperous low-carbon future. Many leaders in the American business community realize the competitive threat to the United States if we do not join other nations by investing in our clean-energy sector. Venture capitalist John Doerr and General Electric CEO Jeff Immelt warn, "There is still time for us to lead this global race, although that window is closing. We need low-carbon policies to exploit America's strengths—innovation and entrepreneurs."[1]

To gain the lead in the clean-energy race—as we have done in other sectors—we need to reduce our global warming pollution as the Clean Energy Jobs and American Power Act requires. The bill puts a price on carbon pollution that recognizes the harms and costs of global warming, and it would level the playing field between the prices of dirty and cleaner energy sources. The Clean Energy Jobs Act, combined with companion measures before the Senate, would create a clean-energy investment program that would cut greenhouse gas pollution, spur clean-energy technology innovation, create new jobs, and increase American energy independence.

The boost to American economic competitiveness from the Clean Energy Jobs bill costs relatively little, particularly when compared to its benefits. The Environmental Protection Agency analysis of S. 1733 found that the "likely impacts of S. 1733 would be similar to H.R. 2454," the American Clean Energy and Security Act passed by the House on June 26.[2] The Environmental Protection Agency's analysis of ACES found that the "average household consumption would be reduced by less than 1 percent in all years." The EPA estimated that the overall average cost to households would be $80 to $111 annually—less than the cost of a postage stamp a day.

The EPA's recent analysis reiterated an important finding from the Congressional Budget Office that the ACES bill would *benefit* the least well off in American society. "Lower-income households are on net better off than without the [pollution reduction] policy." The EPA noted that another study of H.R. 2454 confirmed that:

> "In 2015 the benefit of these allowance allocation approaches more than offset higher cost of goods and services resulting from the [pollution reduction] policy for households in the bottom two income deciles."[3]

In other words, the Clean Energy Jobs bill would increase American competitiveness while helping those at the bottom of the income ladder.

In addition, there are several elements that are critical for making America more competitive that should be included in clean energy legislation:

- A declining limit on greenhouse gas pollution that achieves a 20 percent reduction by 2020 would boost investments in clean-energy technologies.
- Protection of tropical forests from destruction would prevent significant pollution at a very affordable price.
- An independent Clean Energy Deployment Administration would provide resources to commercialize to scale promising clean-energy technologies.
- A "Rebuild America" program to retrofit buildings to dramatically increase their efficiency would create jobs, save ratepayers money, and reduce pollution.
- Expanding demand for natural gas as a "bridge fuel" and adopting additional safeguards for gas production would help replace dirty coal and foreign oil.

In addition to domestic legislation, the United States should actively collaborate with the international community to accelerate the development and deployment of technologies in renewable energy, energy efficiency and carbon capture and storage. I will discuss each of these vital programs in my testimony.

Thanks to your leadership, Madam Chair, the Clean Energy Jobs and American Power Act includes several of these measures essential to building a comprehensive clean-energy investment package. *We strongly urge the members of the Senate Environment and Public Works Committee to vote for this bill.* Other important measures in legislation passed or pending before other Senate committees should be joined together before the full Senate debates this bill.

The United States needs to seize the clean-energy opportunity

The world is undergoing another industrial revolution. But this revolution isn't driven by the development of the steam engine or micro chip—it is a clean-energy revolution. Many of our economic competitors, such as China, Germany, and Japan, are racing to develop and manufacture the clean-energy technologies of the 21st century that the world demands as a response to scientists' pleadings to reduce the greenhouse gas pollution linked to global warming. As President Barack Obama noted, "The nation that leads the world in creating new sources of clean energy will be the nation that leads the 21st century global economy."[4]

The creation and production of these clean-energy technologies can create millions of so-called "green jobs." This term can sometimes be misleading because many of these job categories that will grow in a new green economy are familiar today, but in the future workers will produce and install different products. Examples include manufacturing, constructing, or installing clean-energy technologies, forging the steel for wind turbines, installing solar photovoltaic panels on roof tops, designing more fuel efficient cars, or retrofitting existing buildings for efficiency.

The clean-energy sector continues to show promise as an engine of job growth. Despite the terrible economy of the last two years, wind energy is the fastest-growing source of electricity. In 2008, nearly the same number of Americans were building or operating wind turbines as were digging in coal mines–85,000 Americans were employed in the wind industry,[5] compared to nearly 87,000 coal miners.[6] But comprehensive clean-energy legislation is essential to achieve the full potential of this opportunity.

The American Recovery and Reinvestment Act, PL 111-5, has $70 billion in spending for clean-energy programs, including efficiency, renewable energy, advanced battery research, implementation of smart grid technologies, public transportation, and high-speed rail. It also has another $20 billion in clean-energy tax incentives for wind farms, solar panels, plug-in hybrid electric vehicles, and other clean-energy technologies.

After the Recovery Act became law in February, the Department of Energy and other federal agencies took the necessary time to establish rules for granting or loaning funds under these programs. The rules to provide assistance for wind projects were issued in July. Since then, the wind industry experienced significant growth. The American Wind Energy Association reports "the wind industry has seen over 1,600 MW (enough to serve the equivalent of 480,000 average households) of completed projects, and over 1,700 MW of construction starts. These projects equate to about $6.5 billion in new investment."[7] Total U.S. operating wind power capacity prevents the generation of 57 million tons of carbon pollution annually, equivalent to removing 4 million cars from the road.

Only anecdotal data is available about ARRA job creation, but the Political Economy Research Institute at the University of Massachusetts used economic modeling to determine the clean-energy job creation impact of ARRA combined with the American Clean Energy and Security Act, H.R. 2454. This analysis project that the two measures:

> "...can generate roughly $150 billion per year in new clean-energy investments in the United States over the next decade. This estimated $150 billion in new spending annually includes government funding but is notably dominated by private-sector investments...[This] can generate a net increase of about 1.7 million jobs."

Although the net increase of 1.7 million jobs projection does not directly apply to the chairman's mark, it shares many similar provisions with ACES. One could anticipate that the Senate and House energy bills would create a similar number of clean-energy jobs. Importantly, the Political Economy Research Institute analysis also found that "clean-energy investments generate roughly three times more jobs than an equivalent amount of money spent on carbon-based fuels."[8] Another joint study by the University of California, University of Illinois, and Yale University concluded that comprehensive energy and climate legislation would create up to 1.9 million new jobs in the United States.[9]

Another way to create jobs, save consumers money, cut global warming pollution, and keep America competitive would be a comprehensive program to make existing commercial, industrial, and residential buildings significantly more energy efficient. Buildings use 70 percent of all U.S. electricity, and generate 40 percent of total U.S. greenhouse gas pollution. Much of our housing and building stock is old, inefficient, and unnecessarily wasteful. While building codes and green building standards can slash energy use in new buildings, half of the buildings that will be standing in 30 years already dot our landscape.

A comprehensive building efficiency retrofit program using proven, existing efficiency techniques and technologies can cut energy use in buildings by up to 40 percent. Best of all, they can pay for themselves from the energy they save. "Rebuilding America," an analysis by the Energy Future Coalition and the Center for American Progress, found that a retrofit program could create 625,000 direct and indirect jobs.[10] This would also reduce energy bills by billions of dollars annually.

Energy efficiency retrofits create good local construction jobs across the country at a time when well over a million construction workers sit idle in a sagging housing market. And demand for the manufactured products needed to retrofit buildings will result in jobs by revitalizing the manufacturing sector and contributing to sustainable, long-term economic growth. We strongly urge this committee to include a "Rebuilding America" energy efficiency retrofit program in the Senate's clean energy bill.

The United States still leads the world in clean-energy innovation. Promising technologies include thin solar films that cheaply generate electricity, advanced biofuels from agriculture waste, and enhanced geothermal energy.[11] But despite these successful innovations, other nations are building and selling these products. For instance, China is the leading producer of solar PV cells even though the technology was invented and perfected in the United States. Between 1995 and 2005, the U.S. market share of PV cell production dropped from 45 percent to under 10 percent.[12]

The adoption of the Clean Energy Jobs Act would drive new investments in both innovation *and* manufacturing these and other clean-energy technologies. And reinvigorating our manufacturing sector will help drive further innovations.

Economic competitors are seizing the energy opportunity

Today we have an unparalleled opportunity to rebuild America's economy and strengthen the middle class through investments in clean-energy technologies. We can create well-paying jobs even as we respond to pressing energy and environmental challenges.

While we continue to debate the costs and benefits of clean-energy legislation, other countries have already made major investments towards becoming low-carbon economies. Interestingly, a fair number of these countries are non-Annex I countries under the Kyoto Protocol. These are developing countries that are not required to make mandatory emissions cuts under the terms of the Kyoto Protocol, including China, India, and South Korea. Germany and Spain have also made clean-energy investments and are reaping the benefits.

China

Two months ago, I led a small American delegation to China that included Senator Tom Daschle, Ambassador Wendy Sherman, MIT Professor John Deutch, former Deputy Secretary of Defense Rudy deLeon, and SEIU President Andy Stern. Our group spent three full days speaking with some of the senior-most government officials, leading academics, and members of the financial industry about a range of issues of utmost importance between our two countries.

These discussions made us realize that climate change and clean energy rank among the very top issues of importance to China's social and economic development challenges. China fully grasps the strategic economic opportunity that the clean-energy sector represents. As Li Keqiang, first vice premier of China and Premier Wen Jiabao's deputy, has publicly said on various occasions, the development of new energy sources represents an opportunity to stimulate consumption, increase investments, achieve stable export opportunities, and adjust China's energy structure, all while enhancing its international economic competitiveness.[13]

China is also diversifying into clean energy sources for energy security concerns. It already imports almost 50 percent of the oil it consumes, and for the first time in 2007, started to import coal. With China's consumption expected to grow from eight million barrels of oil a day currently to 20 million barrels of oil a day by 2030, its demand for global oil resources is bound to rise steadily and drive oil prices up.[14] It has started to build a strategic oil reserve, encouraged its state-owned energy companies to invest in overseas energy assets, and sealed multibillion dollar oil and gas supply contracts with countries including Russia, Brazil, Iran and Venezuela.[15] But Beijing knows that a reliance on fossil fuels is not a complete solution, and is thus making heavy investments in domestic sources of clean and renewable energy.

Over the past few years, China has quietly made significant investments into low-carbon infrastructure.[16] Although reported numbers vary, allocations to clean energy and sustainable development account for 14.5 percent of China's $586 billion economic stimulus in 2008, while the proportion is as high as 34 percent if supporting rail and grid infrastructure is included.

China is making steady progress to meet its goal to reduce energy consumption per unit of gross domestic product by 20 percent of 2005 levels by 2020. It has steadily grown its wind power industry as part of its long-term effort to increase its share of non-fossil fuel power to 15 percent of its overall energy mix by 2020. China's installed wind power capacity has doubled for each of the past four years, and this year it has launched major investment programs in solar photovoltaic installation to catalyze the domestic solar market.

The rapid growth in renewable energy deployment in China has compelled its policymakers to revise their 2020 target for wind power from 30 gigawatts to 100 to 120 gigawatts, and for solar power from 1.8 gigawatts to 10 gigawatts. China also plans to make significant investments in nuclear energy—$130 billion over the next 15 years. It plans to expand its nuclear capacity from 11 gigawatts to 40 gigawatts in 2020. China had nearly twice the amount of installed renewable energy capacity, excluding large hydro, compared to the United States by the end of 2008 (76 gigawatts versus 40 gigawatts).[17]

China is also an emerging world leader in ultra-high-voltage, or UHV transmission lines, with more than 100 domestic manufacturers and suppliers participating in the manufacturing and supply of UHV equipment. A transmission line from Shanxi to Hubei boasts the highest capacity in the world, and is able to transmit 1,000 kilovolts over 640 kilometers. The State Grid Corporation of China will invest $44 billion through 2012 and $88 billion through 2020 in building UHV transmission lines. China will unveil in the coming months plans to build an extensive smart grid by 2020.

As the world's largest auto market, China is serious about making the clean-energy vehicles of the future. They have slashed gasoline subsidies and increased taxes on cars with bigger engines while reducing taxes on smaller cars. They are spending $2.9 billion on developing energy efficient vehicles. China wants to raise its annual production capacity of hybrid and all-electric cars and buses to 500,000 by the end of 2011. This would account for only 5 percent of total car sales, but is up from only 2,100 in 2008. Thirteen cities will roll out pilot subsidy programs for the purchase of "new energy vehicles," ranging from $7,350 for small hybrid passenger cars to $87,700 for large, fuel-cell-powered commercial buses. The subsidies will target public-sector purchases such as public transportation, sanitation, and postal services. The State Grid plans to deploy pilot networks of charging stations for electric cars in Beijing, Tianjin, and Shanghai, while Nissan-Renault plans to help establish a pilot charging infrastructure network in Wuhan.

China's emerging leadership in electric vehicles is based on its innovation in energy storage technology. The world's first mass-produced, plug-in hybrid is the F3DM, launched by China's BYD Auto last December. Just six years ago BYD Auto was only in the business of making batteries for mobile phones. The F3DM sells in China for approximately $22,000, and the founder of BYD, Wang Chuanfu, is now China's richest person.[18]

During our delegation's visit to Beijing, we rode on a high-speed train to Tianjin, traveling 65 miles in just 30 minutes—less than half the time compared to conventional rail. This is part of the largest railway expansion in history. China plans to spend almost $300 billion expanding its railway network from 78,000 km today to 120,000 km in 2020. Of this, 13,000 km will be high-speed rail. The 1,300 kilometer Beijing-Shanghai line is under construction and will reduce travel time between those destinations from 14 hours to 5 hours when it opens in 2013. This will attract an estimated 220,000 daily passengers and should dramatically reduce air travel between the metropolises.

What's more, China is poised to have the world's largest network for intracity urban rail transit. About 2,100 km of railway lines will be laid and operational by 2015 in 19 cities. Ten cities currently have 29 urban rail routes, totaling 778 km, and 14 cities are building 46 urban rail lines, which total 1,212 km.

Aside from infrastructure, China is also leading the way in manufacturing clean-energy technologies and products. It accounts for nearly 40 percent of the global production of solar photovoltaic panels. Historically, the vast majority of this production has been exported, but as described above, a push to develop the domestic solar market will mean that more solar panels will stay in China to produce clean electricity for the benefit of its own people.

China's rapid wind power expansion has also created a vibrant wind power manufacturing sector. Where some five years ago there were virtually no domestic manufacturers of wind components, now there are as many as 70 to 100 companies, with Sinovel, now the seventh largest in the world, producing one thousand 1.5 MW turbines in 2008 and with a capacity to produce twice this quantity. Though the first priority of these companies is to satisfy the growing domestic market, they are starting to explore international markets.

China's program to increase renewable energy and efficiency will also lower its greenhouse gas pollution. *The Washington Post* noted that "last week, the Paris-based International Energy Agency said the efforts are starting to pay off...[and] lowered its estimate of future Chinese greenhouse gas emissions."[19] China has also signaled for the first time that it intends to manage carbon emissions growth. Last month, President Hu Jintao announced that China will reduce its carbon emissions per unit of GDP by a "notable margin." How quickly such a deceleration leads to a peaking of China's total emissions depends on the specific carbon intensity targets, but senior Chinese officials have recently given public assurance of its desire to peak its carbon pollution "as early as possible."[20]

All these actions send signals to the international business community. According to a recent report, the clean tech market in China alone has a potential to develop into a $500 billion to $1 trillion per year market by 2013.[21] Enterprising American companies such as First Solar and American Superconductor have sensed the economic opportunity by investing directly in the Chinese clean energy market or, in the case of Duke Energy, partnering with Chinese companies to develop clean-energy projects here in the United States.

Make no mistake about it—China wants to lead the world in the development and production of clean-energy technologies for use at home and abroad. The United States should assume that China is in the clean-energy technology race to win.

India

The Indian government has established the Ministry of New and Renewable Energy, making it the only country in the world with a separate ministry charged with transitioning the country to an economy that significantly increases its use of clean and renewable energy sources. Nine percent of its installed power capacity consists of renewable sources, excluding hydropower, which accounts for another 25 percent. In time, other renewable sources will play a larger role. As part of India's renewable energy push, the Clinton Climate Initiative is helping the Indian state of Gujarat build the world's largest solar facility, totaling 3 gigawatts of installed solar power.[22]

India is the world's fifth-largest installer of wind energy capacity, and Indian company Suzlon is one of the world's leading wind energy companies. The national government is seriously considering enacting a national renewable electricity standard of 20 percent by 2020, and at least a dozen progressive Indian states have already set their own requirements, ranging from 0.5 to 10 percent renewable energy.

India plans to adopt a comprehensive climate change action plan, which includes the following measures.

- A market-based scheme for the trading of energy efficiency certificates that is worth an estimated $15 billion
- New energy efficiency standards for home appliances and buildings
- The country's first-ever mandatory fuel economy standards for automobiles
- Construction of the world's largest installed solar photovoltaic capacity at 20 gigawatts by 2020, which is equivalent to the capacity of 20 new nuclear power plants

South Korea

South Korea is the first of the non-Annex I countries to publicly announce its intentions to cap carbon pollution by 2020. It will take one of three possible emissions control plans:

- One that results in an 8 percent increase from 2005 levels by 2020
- One that keeps pollution at 2005 levels
- A 4 percent cut in pollution below 2005 levels

South Korea is also considering a renewable electricity standard that would require renewable energy from wind, sun, and other sources to comprise at least 10 percent of the country's overall electricity by 2020, up from 2.5 percent in 2008.

South Korea allocated 79 percent of its $38 billion economic stimulus package to clean energy, including programs for renewable energy technologies, energy efficient buildings, low-carbon vehicles, and water and waste management. It has adopted a separate "Five-Year Green Growth Plan" (2009 to 2013), under which $83.6 billion, representing 2 percent of its GDP, will be spent on climate change and energy, sustainable transportation and developing green technologies. This five-year plan is expected to stimulate $141 billion to $160 billion in production and to create 1.56 million to 1.81 million jobs in clean-energy industries such as solar panel manufacturing and advanced battery production.

Germany

Germany is a global frontrunner in the clean-energy transformation. It has one of the most aggressive greenhouse gas emissions targets, even within the European Union. It announced earlier this year new targets that would lead up to a 40 percent reduction in greenhouse gas emissions by 2020 from 1990 levels.

It also has the world's largest installed capacity of solar photovoltaic panels and second-largest amount of wind power. Its total installed renewable energy capacity by the end of 2008 was 34 gigawatts, compared to 40 gigawatts of renewable capacity in the United States. The renewable energy sector is a major source of German exports. The country is home to Q-Cells—the world's largest solar company—and is second only to China in the production of solar PV panels.

The success of the German solar industry, despite relatively poor solar resources, is due to strong government financial support provided through feed-in-tariff policies. The tariff requires German electric utilities to buy all wind, solar, and other renewable power at a price per kilowatt-hour higher than that of power generated from coal, nuclear, or natural gas. This has sent strong market signals to renewable energy project developers and manufacturers. By 2010, Germany is expected to have 43 percent of the world's market share of installed solar PV.[23] The German renewable energy sector now employs 280,000 people, and this may grow to 500,000 by 2020.[24]

Spain

Spain has one of the most aggressive programs to increase its productivity and create jobs through investments in clean-energy technologies and efficiency. It generates about one quarter of its electricity through renewable resources—about eight times more than the United States. Wind energy alone is able to supply up to 40 percent of Spain's energy needs during peak wind periods.[25] Luis Atienza, CEO of Red Electrica, noted that "Wind is no longer a marginal supplier for us."[26]

The Spanish government estimates that clean-energy jobs employ 200,000 people—twice as many as in 2000. In addition, Spain is heavily investing in energy efficiency, which could employ 800,000 construction workers.[27] *The Washington Post* reports that "through a combination of new laws and public and private investment, officials estimate that they can generate a million green jobs over the next decade."

The United States can and must keep up

The United States was a worldwide leader in the development and production of clean-energy technologies, but we lost that lead in the 21st century. From 2001 to 2008, the United States did little to spur investments in clean-energy technologies. For instance, the American Wind Energy Association notes that "The renewable energy production tax credit…is the primary federal incentive for wind energy and has been essential to the industry's growth."[28] Yet it was allowed to lapse in 2001 and 2003, disrupting plans to build wind facilities. This is just one example of neglect that enabled other nations to pull ahead of us in the race to develop and deploy clean energy technologies.

President Obama has ended this drought. He understands that clean-energy investments can drive economic recovery and long-term growth, and restore American economic competitiveness. Since he took office 10 months ago, the administration has proposed and adopted numerous policies to invest in clean-energy industries, create jobs, cut oil use, make America more energy independent, and reduce greenhouse gas pollution. The pollution reductions from motor vehicles mean that there will be fewer reductions required from power plants and other industrial sources to meet the goals of the Clean Energy Jobs Act.

President Obama and the 111th Congress' first big down payment on clean-energy jobs was in the American Recovery and Reinvestment Act, which *The New York Times* called "the biggest energy bill in history."[29] The act, which became law in February, includes $91 billion in clean-energy spending and tax incentives.[30] ARRA will invest in:

- Renewable energy sources such as wind, solar, and geothermal energy
- Retrofitting government buildings and private homes to increase their efficiency
- Building public transit and high-speed rail
- Research on advanced batteries and other technologies
- Extending tax incentives for wind and solar energy, and adding new incentives for plug-in hybrid electric vehicles

On May 19, 2009, President Obama announced a plan to increase motor vehicle fuel economy standards from 25 miles per gallon today to 35.5 miles per gallon by model year 2016, a 40 percent improvement.[31] Over the life of the program, this would save 1.8 billion barrels of oil, and reduce greenhouse gas pollution by 900 million metric tons. This effort had the support of the major auto companies, United Auto Workers, California, and other states that wanted to require greenhouse gas pollution reductions from cars.

President Obama also issued an executive order to reduce the federal government's energy use and greenhouse gas pollution. The order "builds on and expands the energy reduction and environmental requirements of Executive Order 13423 by making reductions of greenhouse gas emissions a priority of the federal government."[32] This should lead to significant pollution reductions by 2020.

Just this week, the Department of Energy announced $151 million in funding for 37 clean-energy innovation projects—including research in advanced batteries and biofuel-producing bacteria—under the Advanced Research Projects Agency-Energy, or ARPA-E program. ARPA-E's mission is to "develop nimble, creative, and inventive approaches to transform the global energy landscape while advancing America's technology leadership." This would be the first round of funding under ARPA-E, which will receive a total of $400 million under ARRA.[33]

All of these actions can help the United States reinvigorate its clean-energy companies so that they can compete with firms from other nations. But American entrepreneurial efforts need additional support from economic incentives and price signals supplied by comprehensive clean-energy jobs and global warming pollution reduction policies.

The clean-energy agenda is a competitiveness strategy for the United States

Retooling the energy systems that fuel our economy will involve rebuilding our nation's infrastructure. We can create millions of middle-class jobs along the way, revitalize our manufacturing sector, increase American economic competitiveness, reduce our dependence on oil, and boost technological innovation.

Reducing global warming pollution will stimulate investment. Nobel Prize-winning economist Paul Krugman noted that steps to reduce global warming pollution would act as an economic stimulus.

> "A commitment to greenhouse gas reduction would, in the short-to-medium run, have the same economic effects as a major technological innovation: It would give businesses a reason to invest in new equipment and facilities even in the face of excess capacity. And given the current state of the economy, that's just what the doctor ordered."[34]

Clean-energy investments can also provide the opportunity for more broadly shared prosperity through better training, stronger local economies, and new career ladders into the middle class. Reducing greenhouse gas pollution is critical to solving global warming, but it is only one part of the work ahead. Capturing this economic opportunity is the central challenge of our current energy and climate policy debates. Clean energy investments are a strategic asset, and an opportunity to drive innovation broadly across the U.S. economy.

The three pillars of a clean-energy economy

In a recent report, "The Clean-Energy Investment Agenda," the Center for American Progress identifies the three pillars of the clean-energy transformation: restoring markets, expanding financing, and rebuilding infrastructure.[35] Each of these pieces is distinct and essential to building a low-carbon economy, and each will require specific policy attention. Both the American Clean Energy and Security Act passed by the U.S. House of Representatives and the Clean Energy Jobs and American Power Act in the Senate contain numerous provisions that directly support each of these core pillars.

Restoring markets

The Clean Energy Jobs Act would create a price for carbon by imposing a declining limit on greenhouse gas pollution from major industrial sources. It would also require improved energy efficiency in buildings and create incentives to deploy low-carbon technologies. The effect of these and other similar elements would shift economic incentives toward low-carbon, high-efficiency technologies and practices. This would create and expand markets for low- and no-carbon fuels and technologies, from natural gas to energy efficient windows.

Expanding financing

Quite often, it is the initial seed of public funds that enables the launch of a vibrant new industry led by private investment. Given the myriad benefits and enormous economic development potential of the emerging clean-energy sector, these nascent technologies are clear candidates for similar kinds of public assistance.

The Clean Energy Jobs Act would provide funds for investments in renewable energy and energy efficiency, electric vehicles and other advanced vehicle technologies, research at "clean energy innovation centers," and in carbon capture-and-storage technologies for power plants.

Both Germany and Canada have "green banks" that help emerging clean-energy technologies get the capital to become commercially viable. In Germany, KfW Bankengruppe, Europe's largest promotional bank, has evolved to become a major financier of sustainable development projects around the world; in 2008, it funded more renewable projects in developing countries than the World Bank. In Canada, the not-for-profit foundation Sustainable Development Technology Canada (SDTC) operates two funds to assist new clean energy technologies through the development and demonstration process, helping reduce risk and attract private sector investors to drive commercial success.

We propose the creation of an independent Clean Energy Deployment Administration to accomplish this goal in the United States. It would be a publicly owned bank designed to open credit markets and motivate business to invest in clean-energy technologies. CEDA would work closely with private banks to provide loan guarantees, credit enhancements, and other financing tools to stimulate private-sector lending and investment in projects that cannot access commercial financing on economically feasible rates and terms.

Funding for CEDA would require an initial investment of $10 billion, with additional capital of up to $50 billion over five years. After that, it would cover its own operational costs through fees charged for its services. Initial capital of $50 billion could enable CEDA to support up to $500 billion in loans over 20 years. This, matched with equity investments, could ultimately translate into $1 trillion worth of clean-energy investments.[36]

Both ACES and the American Clean Energy Leadership Act (ACELA, S. 1462) would establish a Clean Energy Deployment Administration. While CAP supports those provisions, the need for stable capital to these new industries is so vital that we urge you to go beyond those provisions and establish a well capitalized independent CEDA as part of the clean-energy bill debated by the entire Senate.

Rebuilding infrastructure

Building the clean-energy economy and keeping America competitive in a globalized world will require major investments in revitalizing our energy infrastructure. Some key policies to rebuild this infrastructure are part of the Clean Energy Jobs Act, while others are not within the purview of the Senate Environment Committee. All of these measures should become part of the clean-energy bill considered by the entire Senate.

- **Build a cleaner transportation infrastructure**: The Clean Energy Jobs Act would fund transportation projects that reduce greenhouse gas pollution. It would also help American truckers make their vehicles more efficient and emit less pollution. The NAT GAS Act, S. 1408, would create incentives for heavy trucks, buses, and fleet vehicles to use natural gas rather than fuels made from oil—two-thirds of which comes from other nations—and we urge its inclusion in any final package.
- **Train people for the energy jobs of the future**: The Clean Energy Jobs Act would provide resources to train people for efficiency and renewable energy jobs. The bill would also help train future nuclear industry workers. We must also ensure that any allocation of federal funds to support this ramp up is accompanied by strong labor standards and community reinvestment strategies so that the fruits of investments in clean energy benefit all Americans.
- **Modernize the electricity grid**: The United States must resolve the gridlock over planning, siting, and cost allocation for new electricity transmission lines. The physical and cyber security of the grid must also be improved. The Clean Renewable Energy and Economic Development Act, S. 539, and ACELA would address these problems.
- **Help manufacturers build clean-energy products**: In the Senate, ACELA includes provisions on industrial efficiency. The Investments for Manufacturing Progress and Clean Technology Act, or IMPACT, currently before the Senate Commerce Committee, would provide low-cost loans to help manufacturers retool to produce clean-energy technologies. These provisions should be included in the energy and global warming bill before debate by the entire Senate.

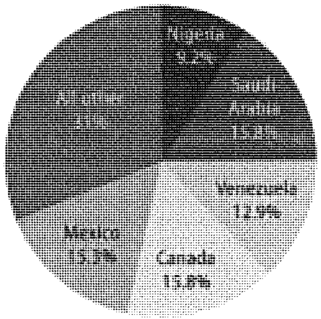
Together, these policy pillars provide a comprehensive strategy for investing rapidly in the deployment of new technology, increasing opportunities for U.S. businesses, and expanding markets for American technology exports.

Fuelling the transition

U.S. natural gas can increase energy security, decrease oil use, and fuel the transition to a clean-energy economy. Natural gas is "by the far the cleanest burning" fossil fuel and produces slightly more than one-fifth of all U.S. energy.[37] Oil and coal combined comprise about two-thirds of all energy consumption, and their combustion produces substantially more global warming and other conventional pollution than natural gas.

Combusting natural gas to power motor vehicles produces about one-third less global warming pollution compared to petroleum burned in cars, and reduces our reliance on foreign oil, which will only become more expensive as international demand rises sharply as a result of economic growth in China and other developing countries. When used for electricity generation, natural gas produces about half of the global warming pollution compared to coal. It should play a larger role in our energy mix and help reduce our oil use and greenhouse gas pollution given its domestic abundance and lower pollutant levels.

U.S crude import shares



Energy Information Administration, "Petroleum Navigator-U.S. Crude Oil Imports by Country of Origin," available at http://tonto.eia.doe.gov/dnav/pet/pet_move_impcus_a2_nus_epc0_im0_mbbl_a.htm (last accessed April 7, 2009).

There is another obvious advantage to increasing the use of natural gas as the U.S. transitions away from fossil fuels. U.S dependence on foreign oil transfers hundreds of billions of dollars that could be invested at home to hostile or unsavory regimes every year. Furthermore, our enormous appetite tightens global supply and demand dynamics, meaning countries like China might be more insistent on securing resources in problematic countries like Iran and Sudan than if the U.S. was actively investing in clean energy alternatives.

The recent development of technology that enables the affordable development of significant shale gas reserves in the lower 48 states could fundamentally alter the U.S. energy system and play a larger role in helping to more rapidly and cost-effectively speed our reduction in oil use and enhance our national security. The Energy Information Administration estimates that the United States has approximately 1,770 trillion cubic feet of technically recoverable gas, including 238 trillion cubic feet of proven reserves. At the current production rates, the Department of Energy believes that "the current recoverable resource estimate provides enough natural gas to supply the United States for the next 90 years."

Using cleaner domestic natural gas will enhance our economic competitiveness. Since it is produced in the United States, higher gas demand will create more jobs, and using domestic gas in lieu of imported oil would reduce our trade imbalance, keeping energy dollars at home instead of exporting oil dollars overseas. Gas could also be the basis for development of new, clean-energy technologies such as wind-gas hybrid electricity plants, carbon capture and storage, and natural gas transportation fuels. Such low-carbon technologies would find a market overseas.

The Clean Energy Jobs and American Power Act has provisions that would expand the use of natural gas and boost U.S. competitiveness:

- The new greenhouse gas pollution standards for heavy-duty vehicles and engines, and nonroad engines, could increase demand for natural gas as a replacement fuel.
- The Clean Energy and Accelerated Emission Reduction Program would create incentives to use cleaner-burning gas for electricity generation.
- The advanced natural gas technologies program would support research and development of advanced technologies for carbon capture and storage from natural gas-fueled electric plants.

Other measures could be added to the bill that would enhance U.S. competitiveness by replacing coal or oil with cleaner burning domestic natural gas, such as:

- Establishing a $14 per ton allowance floor price for carbon pollution in 2012 to level the playing field between old, dirty coal plants and newer, cleaner natural gas plants. The price should rise by 5 percent annually plus inflation from 2013 to 2017, and by 7 percent plus inflation after 2017.
- Changing the bill's international offset ratio from 5-4 to 3-2 as way of reducing offsets and benefiting gas.
- Including the NAT GAS Act, S. 1408, in the bill that the Senate will debate on the floor. It would create incentives to boost investments in heavy-duty vehicles powered by natural gas. This fuel has the potential to replace 100 percent of the petroleum used in heavy trucks.
- Converting urban vehicle fleets—including taxis, delivery vehicles, and municipal government fleets—to low-carbon fuels such as natural gas.

Some natural gas companies have proposed an incentive program to reward utilities that switch from coal to natural gas electricity generation. They have proposed a "bridge fuel credit" that would reward additional allowances to utilities that make this switch. In one version, fuel-switching utilities would receive new greenhouse gas pollution allowances that are above and beyond the pollution limits established by the Clean Energy Jobs Act. Adding such allowances for this purpose would increase the amount of pollution in the atmosphere, and undermine the overall pollution reduction goal of the bill. This would offset the benefit of switching from coal to gas. We would urge that you reject this approach, and instead provide any bridge fuel credits from the existing pool of allowances under the pollution limits, which would not increase overall pollution levels.

The recent closure of a Pennsylvania shale gas production site due to water contamination is also a reminder that increasing demand for shale gas is not without environmental risk. The bill should include additional protections for air, water, and climate from an increase in natural gas production. These measures should include:

- Conducting a comprehensive analysis of the impact of natural gas production on air, water, land, and global warming. Include a compilation of best practices and recommendations for new state and or federal safeguards.
- Requiring public disclosure on the release of toxic chemicals used during the production of natural gas.
- Restoring protection for groundwater from oil and gas production under the Safe Drinking Water Act.
- Requiring that shale gas producers meet the Natural Gas STAR program standards so that they capture and resell fugitive methane—a potent greenhouse gas—instead of releasing it into the atmosphere and exacerbate global warming. The Clean Energy Jobs Act only includes methane reduction as a voluntary offset.

International cooperation on clean-energy is essential to reduce global warming and increase economic competitiveness

In 2007, the Nobel Prize-winning United Nations Intergovernmental Panel on Climate Change issued a series of groundbreaking reports on the consequences of global warming. The reports led to the conclusion that the increase in temperature due to greenhouse gas pollution should be no greater than 2 degrees centigrade by 2050. This translates to an atmospheric greenhouse gas emission level of no more than 450 parts per million, up from 395 parts per million today. To achieve these goals developed countries must reduce their emissions by at least 80 percent by 2050, and developing countries must also make significant reductions.

Since the IPCC report a flood of scientific evidence suggests that the predicted impacts of global warming—including temperature rise, ice caps melting, and drought—are occurring ahead of the projected schedule. Nations around the world, including those long resistant to global warming pollution reductions, have reversed course and now support steps to cut pollution. The G-8 nations agreed at their July 2009 meeting that "the scientific view that the increase in global average temperature above pre-industrial levels ought not to exceed 2 degrees C."

At the same time, there is great concern in the United States and among other developed nations that the cost of greenhouse gas pollution reductions would make their manufacturers less competitive with rivals from the developing world. This is a legitimate concern, but there are very cost-effective ways to address it.

The best way to address competitiveness concerns is a strong global climate agreement

Unfortunately, some have tried to frame the competitiveness and clean-energy debate by assuming that American industry and businesses cannot rise to the challenge posed by a clean-energy economy. They argue that if the United States moves ahead with reductions in global warming pollution it would raise prices of domestic goods and put the United States at an economic disadvantage compared to countries that do not undertake such efforts. Their preferred solution is to continue business as usual, as the United States falls behind in the race to build and sell the clean-energy technologies of the future.

A better way exists to make sure American companies remain competitive with those from nations that refuse to reduce their greenhouse gas pollution. A binding international agreement with all major emitting nations contributing to reductions in greenhouse gas pollution and cooperating on mitigation, adaptation, and technology cooperation is the most effective way to address U.S. competitiveness.

A multilateral agreement will discourage unilateral actions, reduce trade tensions in key overseas markets, and be regarded favorably as consistent with World Trade Organization rules and obligations. The United States should provide financial and technological assistance to the least developed nations for global warming mitigation and adaptation measures and induce major developing countries to commit to global climate action.

Such an arrangement was agreed to under the Bali Action Plan of 2007 by the members of the United Nations Framework Convention on Climate Change, including the United States. Both S. 1733 and H.R. 2454 include measures to implement such a plan. They would allocate allowances under the pollution reduction and investment scheme for investments in clean technologies by developing nations, as well as adaptation assistance and tropical forest conservation. These allocations—2 percent to clean technology and adaptation and 5 percent to tropical forests—are critical to the achievement of cost-effective pollution reductions.

The Clean Energy Jobs Act maintains competition for energy-intensive industries

Many manufacturers in energy-intensive, trade-sensitive industries are very concerned about the impact of a global warming reduction program on their ability to compete with foreign firms from nations without such a system. This includes companies in the steel, cement, paper, chemical, glass and other similar industries. The Clean Energy Jobs Act would provide companies in these and other similar industries with free allowances under the carbon pollution reduction program to cover increased costs incurred for reducing greenhouse gas pollution. This assistance would ensure that energy-intensive, trade-sensitive firms would remain competitive.

Tropical forest conservation is an important global carbon abatement strategy

Tropical forest conservation is essential to reducing greenhouse gas pollution and the impacts of global warming. Deforestation accounts for 17 percent of global warming pollution—more than all the world's cars, trucks, planes, trains, and ships' pollution combined.

Along with Senator Lincoln Chafee, I co-chaired the bipartisan Commission on Climate and Tropical Forests, which just released its report "Protecting the Climate Forests: Why Reducing Tropical Deforestation Is in America's Vital National Interest."[38] The Commission strongly urged that "U.S. policymakers and the international community move rapidly to scale up a global effort to protect tropical forests as the most cost-effective way to achieve fast, large-scale reductions in CO2 emissions." Michael G. Morris, Chairman, President, and CEO of American Electric Power, the largest electric utility in the United States, said tropical forest conservation "is one of the most effective and inexpensive tool[s] for addressing climate change, and provides an excellent way to mitigate the costs of other climate solutions."

Many developing nations, including Brazil and Indonesia, which together account for 50 percent of global deforestation, are eager to partner with the United States to protect their climate forests. Brazil has established a goal of reducing emissions from the Amazon by 80 percent by 2020 and is already making impressive progress in that direction, including robust monitoring and verification systems. Indonesia is moving in a similar direction. These efforts could be focused, honed, and replicated globally.

Protecting climate forests is as much an economic imperative as it is a climate one. By including tropical forests in U.S. climate policies, the United States can cut in half future clean-up costs facing American companies. This would save the United States $50 billion by 2020 compared with the costs of domestic action.

The report found that this would require public investments of $1 billion by 2012, and growing to $5 billion public and $9 billion private investments by 2020. The Clean Energy Jobs Act reflects these recommendations because it provides significant resources for tropical forest protection – 5 percent of pollution allowances. The Senate Environment Committee estimates that "by 2020, this program will achieve additional emission reductions equivalent to 10% of U.S. emissions in 2005."[39]

International collaboration will accelerate the transformation to a clean-energy economy

The clean-energy race is not a zero-sum game. The energy sector is the world's biggest industry, providing enormous investment and employment opportunities. According to the International Energy Agency, some $26 trillion in energy infrastructure investments will be needed from now until 2030 to meet projected global energy demand.[40] Because of the climate challenge's urgency and the sheer scale of the transformation of our energy structure necessary to meet it, it is important that the United States collaborate with other nations to develop low-carbon technologies.

Although it may seem counterintuitive, technology collaboration is a competitiveness strategy in and of itself because it spurs innovation and accelerates the deployment and diffusion of such technologies. International clean-energy cooperation is essential for a prosperous clean-energy economy because it results in tangible benefits in innovation, investment, and job creation above and beyond what the United States could accomplish with a "go-it-alone" approach.

Moreover, cooperation with developing nations on clean-energy technology development projects helps the United States begin to fulfill the mandate of the Bali Action Plan to provide international technological and financial support to help developing countries commit to a global climate deal, thus contributing to a level economic playing field.

While there are many potential international partners in clean-energy cooperation, China is one of the most obvious candidates. China and the United States are the two largest annual emitters of greenhouse gas pollution, and together account for more than 40 percent of the world's share. They have a mutual imperative to transition to a clean-energy economy.

Since both nations face national security challenges from their reliance on foreign oil, the development of clean, domestic, and renewable energy sources should be a priority for both. Furthermore, the United States and China's continued reliance on coal-fired power for electricity generation—50 percent and 80 percent, respectively—must be addressed to limit the threat posed by global warming.

The U.S.-China Clean Energy Research Center created in July provides an ideal platform to initiate these collaborations. The joint research center has identified three focal points for research—building energy efficiency, producing cleaner vehicles, and developing advanced coal plants, which includes those that employ carbon capture-and-storage (CCS) technology. To support this effort, the Center for American Progress, in collaboration with the Asia Society Center on U.S.-China Relations, developed a roadmap for Sino-American cooperation on CCS research, development, and deployment.[41] These recommendations will be released on November 4.

CCS offers potential for achieving significant reductions in global greenhouse gas pollution from coal-fired power plants. It should be part of a portfolio that includes dramatic gains in efficiency and renewable electricity. But before we commit ourselves to this technological pathway, it is critical to conduct more CCS demonstration projects to generate accurate cost and environmental safety assessments, develop accepted practices and standards for sequestration, and establish a market for private sector investment. Our upcoming proposal identifies opportunities for immediate collaboration that will produce quick results, while simultaneously focusing on the longer-term goals of retrofitting existing plants and developing financing infrastructure.

First, the proposal lays out a blueprint for rapid cooperation on large demonstrations of geological sequestration of pure CO2 streams that exist today in China. It has installed over 100 coal gasifiers that produce pure or "pre-captured" CO2 streams that currently vent into the atmosphere from a variety of heavy industrial plants, such as chemical and cement facilities. We recommend a set of large projects at multiple sites within China with substantial U.S. contributions in know-how, equipment, and science.

Such collaborations could serve as templates to test various sequestration technologies, which we will eventually want to deploy in the United States and elsewhere, and to build regulatory and financial infrastructures at less cost than would be possible with unilateral development in the U.S. We estimate $50 million to $100 million for each project with a U.S. contribution of $20 million to $30 million. Such a project is highly likely to succeed. It would provide assistance to the Chinese in an area where they lack capacity and open a new market to U.S. suppliers, as well as offer confidence for future cooperation in this and other areas.

The CAP-Asia Society Center proposal also provides a framework for undertaking collaborative research, development, and demonstration of CCS technology (such as post-combustion capture) to retrofit existing coal-fired plants over short-, medium-, and long-term time periods. This process would identify plants in both countries for large-scale retrofit demonstrations and establish commitments for doing so. It would also test new technologies that improve effectiveness and lower costs, along with outlining a long-term strategy for retrofitting coal-fired power plants in both the United States and China that respects the political, industrial, and financial systems of each.

Retrofitting older coal-fired plants would significantly reduce global pollution if the technology can be demonstrated and is cost effective. Most public CCS investments in the United States, such as the Futuregen project, are aimed at building new integrated "pre-combustion" plants. But even if this technology succeeds, it will not reduce emissions at the hundreds of older coal-fired power plants that are profitable and unlikely to shut down any time soon. Reducing emissions from these older plants is essential to avoiding a global rise in temperature of more than 2 degrees Celsius.

Additionally, the CAP-Asia Society Center report discusses the creation of a global capital fund designed to distribute funds to companies that innovate or invest in CCS, and develop public financing mechanisms—price guarantees or other market value substitutions—such as those proposed in the American Clean Energy and Security Act and Clean Energy Jobs Act to provide guaranteed returns in the short term.

Both the United States and China stand to gain more through collaboration than through independent pursuit of CCS technology. By conducting sequestration projects in China instead of the United States, both sides benefit from lower costs and faster execution. The experience gained through cooperation with China will accelerate the deployment of CCS facilities in the United States, with benefits to job growth, utility and energy companies, and technology firms.

We estimate that cooperation with China on this suite of programs could accelerate large-scale deployment of CCS technology in the United States by 5 to 10 years. Our initial assessment is that this could result in billions of dollars in savings if we can accelerate full-scale deployment of CCS before the anticipated mass commercialization by 2030. Just as importantly, in a few years, nearly 10 million tons of CO2 that would otherwise have entered the atmosphere will instead be stored permanently.

Americans want congressional action to maximize clean-energy investments

Poll after poll demonstrates that Americans want energy policy reform. They understand that investments in clean energy would create jobs. The House of Representatives responded to this desire with the passage of the American Clean Energy and Security Act. It would increase renewable energy and efficiency and reduce global warming pollution.

This bill was also supported by many energy companies and associations, including American Electric Power, Duke Energy, the Edison Electric Institute, Exelon, Pacific Gas & Electric, PNM, and others. Many unions supported ACES too, including the AFL-CIO, United Steelworkers, and others. These companies and unions understand that global warming pollution reductions would spur investment in clean-energy technologies, create jobs, and help restore American clean-energy leadership.

The Clean Energy Jobs and American Power Act would also help unleash billions of dollars of private investment in the development and deployment of wind and solar energy, advanced vehicle batteries, and other clean-energy technologies that will power the world in the 21st century.

Now is the time for the Senate to help launch the rejuvenation of the American economy, beginning with this committee. I strongly urge this committee to pass the Clean Energy Jobs and American Power Act, sponsored by Senators John Kerry (D-MA) and Barbara Boxer (D-CA). America's economic future depends on you.

Thank you.

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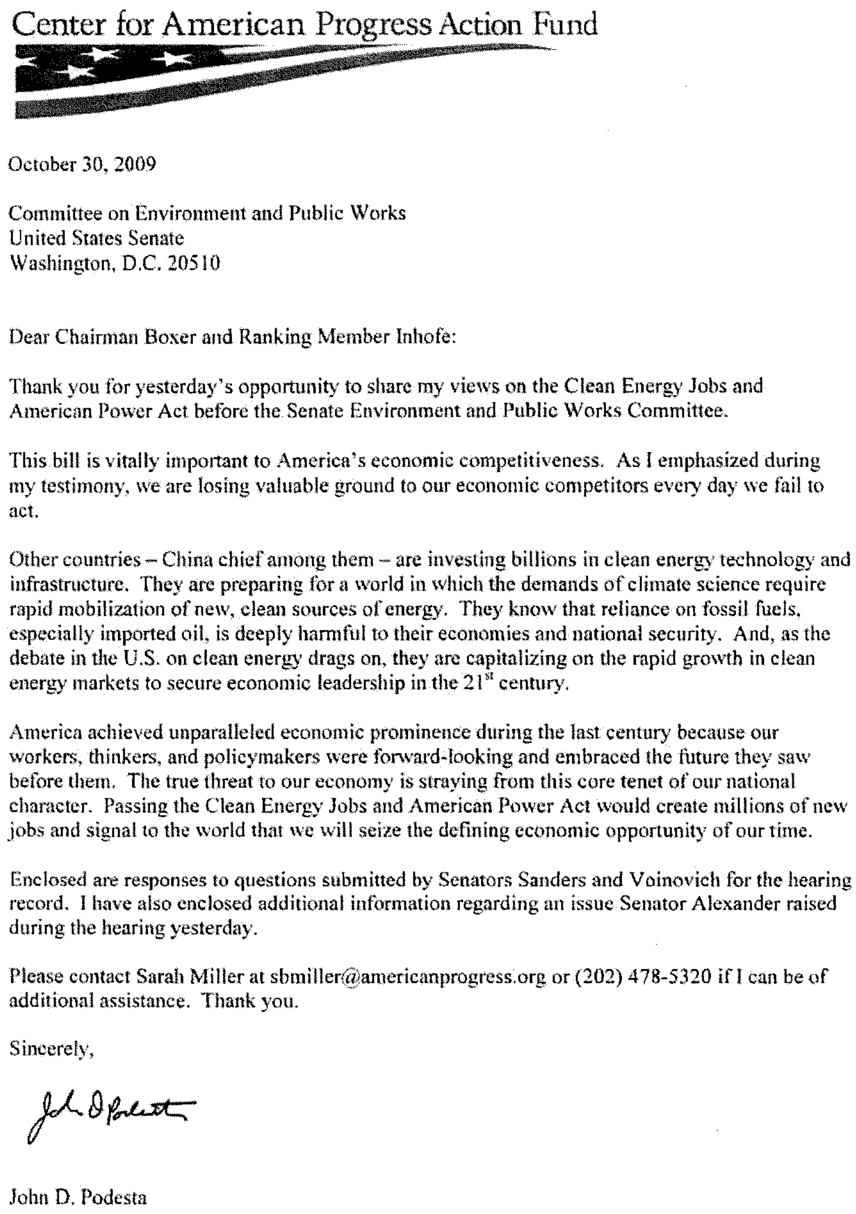


Center for American Progress Action Fund

October 30, 2009

Committee on Environment and Public Works
United States Senate
Washington, D.C. 20510

Dear Chairman Boxer and Ranking Member Inhofe:

Thank you for yesterday's opportunity to share my views on the Clean Energy Jobs and American Power Act before the Senate Environment and Public Works Committee.

This bill is vitally important to America's economic competitiveness. As I emphasized during my testimony, we are losing valuable ground to our economic competitors every day we fail to act.

Other countries – China chief among them – are investing billions in clean energy technology and infrastructure. They are preparing for a world in which the demands of climate science require rapid mobilization of new, clean sources of energy. They know that reliance on fossil fuels, especially imported oil, is deeply harmful to their economies and national security. And, as the debate in the U.S. on clean energy drags on, they are capitalizing on the rapid growth in clean energy markets to secure economic leadership in the 21st century.

America achieved unparalleled economic prominence during the last century because our workers, thinkers, and policymakers were forward-looking and embraced the future they saw before them. The true threat to our economy is straying from this core tenet of our national character. Passing the Clean Energy Jobs and American Power Act would create millions of new jobs and signal to the world that we will seize the defining economic opportunity of our time.

Enclosed are responses to questions submitted by Senators Sanders and Voinovich for the hearing record. I have also enclosed additional information regarding an issue Senator Alexander raised during the hearing yesterday.

Please contact Sarah Miller at sbmiller@americanprogress.org or (202) 478-5320 if I can be of additional assistance. Thank you.

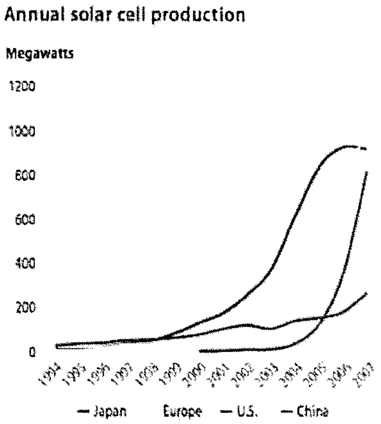
Sincerely,

John D. Podesta

Senator Bernard Sanders

1. In your view, are we in danger of losing the race for sustainable energy technology to nations in Europe, and to China and Japan?

Yes. The United States must act now to pass comprehensive energy legislation that will create the market signals to unleash the creativity and innovation of our entrepreneurs to develop the clean energy technologies of the 21st century. The rest of world, particularly European and Asian countries, are moving rapidly ahead to capture the economic opportunity of clean energy. The solar sector provides a telling picture of where the U.S. stands in the clean energy race. Between 1995 and 2005, the U.S. market share of PV cell production dropped from 45 percent to under 10 percent.[1] Germany, Japan and now China have emerged as leaders in the solar manufacturing space (see chart below).



Source: Worldwatch Institute

Europe

Europe has been the early mover in understanding the enormous economic opportunity that the clean energy sector represents. Two countries are of particular note—Germany and Spain.

Germany is a global frontrunner in the clean energy sector. It has one of the most aggressive greenhouse gas emissions targets, even within the European Union. It announced earlier this year new targets that would lead up to a 40 percent reduction in greenhouse gas emissions by 2020 from 1990 levels.

It also has the world's largest installed capacity of solar photovoltaic panels and second-largest amount of wind power. Its total installed renewable energy capacity by the end of 2008 was 34 gigawatts, compared to 40 gigawatts of renewable capacity in the United States, which has a GDP that is four to five times the size of Germany. The renewable energy sector is also a major source of German exports. The country is home to Q-Cells—the world's largest solar company—and is second only to China in the production of solar PV panels.

The success of the German solar industry, despite relatively poor solar resources, is due to strong government financial support provided through feed-in-tariff policies. This has sent strong market signals to renewable energy project developers and manufacturers. By 2010, Germany is expected to have 43 percent of the world's market share of installed solar PV.[2] The German renewable energy sector now employs 280,000 people, and this may grow to 500,000 by 2020.[3]

Spain has one of the most aggressive programs to increase its productivity and create jobs through investments in clean-energy technologies and efficiency. It generates about one quarter of its electricity through renewable resources—about eight times more than the United States. Wind energy alone is able to supply up to 40 percent of Spain's energy needs during peak wind periods.[4] Luis Atienza, CEO of Red Electrica, noted that "Wind is no longer a marginal supplier for us."[5]

Spain is also home to the largest operator of renewable energy projects in the world—Iberdrola, a utility company. In 2007, it spun out its renewable energy unit, Iberdrola Renovables as a public listed company. The initial public offering for Iberdrola Renovables was for $6 billion, the second largest IPO globally in 2007. It currently has 10.5 gigawatts of operating renewable energy assets, and a pipeline of over 57 gigawatts more, and employed 1,750 people at the end of 2008.[6]

The Spanish government estimates that clean-energy jobs employ 200,000 people—twice as many as in 2000. In addition, Spain is heavily investing in energy efficiency, which could employ 800,000 construction workers.[7] *The Washington Post* reports that "through a combination of new laws and public and private investment, officials estimate that they can generate a million green jobs over the next decade."

China

China is making significant investments into the clean energy technology sector. It has allocated 34 percent of its $586 billion economic stimulus plan announced in November 2008 to sustainable development and clean energy infrastructure.

Through is national energy intensity reduction goals and renewable energy targets laid out in its current Five Year Plan, Beijing has created strong signals to its industries to innovate, manufacture and deploy clean energy technologies. China's installed wind power capacity has doubled in each of the past four years. Wind sector growth has been so rapid that it has revised their 2020 target of 30 gigawatts of installed capacity to 100 gigawatts. China now ranks fourth globally in installed capacity, and this year, will surpass the United States in amount of added capacity.

China has also become the world leader in the manufacture of solar photovoltaic panels and now accounts for almost 40 percent of the world's market share. Until recently, over 90 percent of China's PV production was exported overseas. This year, however, they announced two major incentive programs, one for building roof tops and another for utility-scale solar, to develop its domestic market.

Elsewhere, China is investing $300 billion to build out comprehensive rail infrastructure by 2020, including 13,000 kilometers of high speed passenger rail, and $88 billion over the same period to build out its national grid, in large part to integrate renewable resources of energy from otherwise remote areas of its territory. In both cases, China is using some of the world's leading technologies, both homegrown and developed in collaboration with foreign partners.

China is attracting the business of foreign enterprises because of its vast market for clean technology, estimated to be up to $500 billion and $1 trillion by 2013.[8] But such market growth has only come about because of strong policy signals from the government.

Japan

Due to limited energy resources and the two major oil price shocks of the 1970s, Japan has been forced by energy security concerns to become a leader in energy efficiency and domestic renewable energy.

Legislation established in the late 1970s created the "Top Runner Program," which determines fuel efficiency standards for vehicles and energy efficiency standards for household appliances; a requirement for high energy-consuming plants and large office buildings to prepare and submit medium- and long-term energy-conservation plans. These have been updated periodically, resulting in Japanese companies producing the world's most energy-efficient home appliances and most fuel-efficient cars. It is no wonder its automobile industry, which boasts innovative companies like Toyota and Honda, has performed more resiliently in the midst of a global recession and high energy prices compared to those of the United Sates' Big Three.

Japan's emphasis on energy efficiency in transportation has also created significant investments into its mass transportation sector, and Japan has one of the world's most sophisticated high speed rail systems.

Japan has also built up a strong R&D program for its clean energy sectors. This has translated into technology leadership in solar production, among many other sectors. After China and Germany, it was the world's third biggest manufacturer of solar PV panels, with 1,172 megawatts of manufactured volume in 2008 compared to just 375 megawatts in the United States. It has revived financial incentives for solar equipment manufacturing and installation, and despite the global over-capacity of solar PV panel production, the country's four biggest solar companies—Sharp, Kyocera, Sanyo and Mitsubishi Electric—are investing billions of dollars to double their production over the next few years because their superior product quality has helped them maintain revenue streams over their competitors.[9]

The newly-elected Japanese government wants to maintain its technology leadership in clean energy and is doing so with a plan to implement a carbon pollution reduction law and a pledge to reduce its carbon emissions by 25 percent of 1990 levels by 2020 if other major economies commit to "ambitious targets."[10] Such plans would send an unambiguous signal to its marketplace that clean energy solutions will feature prominently in its future economy.

We risk falling behind.

These developments should serve as warning shots to the United States that if we don't move forward to set up a comprehensive framework for prosperity in a low-carbon future, we will end up as buyers, rather than sellers, of these clean energy technologies of the 21st century.

A 2009 study of inventions among developed countries by the CERNA Research Program on Technology Transfer and Climate Change found those developed nations which were signatories to the Kyoto protocol (and thus set targets to clamp down on their carbon emissions) saw their share of patents in green-tech innovation increase by over 33 percent.[11] Those nations that weren't initial signatories (Australia and the United States) saw no change in their share of total green-tech patents.

The United States has over a century of history as leaders of innovation and technology, from automotives to biotechnology to telecommunications to the Internet. However, because of an underinvestment in clean energy technology research, we are in danger of falling behind our international counterparts. Venture capitalist John Doerr has pointed out in his testimony before this committee, "If you list today's top 30 companies in solar, wind and advanced batteries, American companies hold only six spots. That fact should worry us all."[12]

While the United States remains a leader in venture capital investment, basic research, and technology innovation in clean technology in the clean energy sector, a lack of comprehensive clean energy policies to send the proper signals for deployment is resulting in our best companies seeking international markets to sell their products. American Superconductor, a U.S. firm that sells designs of wind turbines to Chinese wind turbine manufacturers, is finding China a more significant growth market than the United States. Similarly, American firms like Applied Materials and First Solar, sensing the enormous opportunity China's solar industry presents, have been making inroads to grow their business in China rather than at home.

We have a closing window of opportunity to regain global technology leadership, and we must start by passing comprehensive clean energy legislation.

2. Do you support including a cost-effective, flexible energy efficiency investment requirement for the electric utility allocation, similar to what was required for the natural gas allocation?

Yes, we would support a requirement that "the value of no less than one-third of the emission allowances distributed" to electric utility local distribution companies "shall be used for cost-effective energy efficiency programs" for electricity consumers.[13] These resources could fund energy efficiency retrofits for millions of buildings as well as reduce electricity costs for residential, commercial, and industrial customers.

It has been estimated that such a provision would have a number of benefits.[14] It would:

- generate $100 billion for energy efficiency measures;
- create 900,000 new construction and energy services jobs by 2020; and,
- reduce ratepayers' energy bills by $300 billion.

Because this measure would reduce electricity use, it would significantly reduce greenhouse gas pollution as well.

"Rebuilding America," an analysis by the Energy Future Coalition and the Center for American Progress that I described in my written and oral testimony to this Committee, found that retrofitting 40 percent of the nation's building stock would reduce energy bills by $32 to $64 billion annually and create 625,000 jobs.[15] A successful retrofit program requires expansion of financial and cost recovery mechanisms for building efficiency retrofits.

Senator George V. Voinovich

1) Mr. Podesta - In your statement you say that "the United States and China stand to gain more through collaboration than through independent pursuit of CCS technology." I completely agree with you, and that is one reason why I introduced the International Clean Energy Development Act of 2009, which establishes a Development and Commercialization Committee on Clean and Efficient Energy Technologies within the Asia-Pacific Partnership Program Office. It provides one billion dollars over five years for expanding these cutting-edge, cost-sharing partnerships - in hopes that the best ideas for low carbon technologies are brought forward. Are you familiar with the U.S. Asia Pacific Partnership? Would you agree that these types of programs are necessary for bringing China and other developing nations to the negotiating table for accepting emissions reductions?

What the world needs is the joint-deployment of clean energy projects on the ground that will provide real, verifiable emissions reductions. The Center for American Progress, together with the Asia Society, will release a joint study entitled "A Roadmap for U.S.-China Collaboration in Carbon Capture and Sequestration" on November 4, 2009, providing a concrete roadmap for long-term cooperation on the joint development of carbon capture and sequestration projects in both China and the United States.

The report identifies three specific areas of cooperation on CCS:

1. ***Cooperation on sequestration pure CO_2 streams from existing Chinese industrial plants.*** There are now approximately 100 facilities throughout China

which are producing pure streams of CO2 for various industrial purposes. This climate pollution is vented unabated into the atmosphere where it contributes to global warming. The report proposes a first step to mitigate these emissions and prove the benefits of cooperation on part of the CCS puzzle through five jointly funded geological sequestration projects that can easily capture this source of carbon and store 2 million to 3 million tons of CO_2 per year. Each project would cost $50 to 100 million, with a U.S. share of $20 to 40 million. Together these sites could sequester 10 to 15 million tons of CO_2 per year, equivalent to taking 1.7 to 2.5 million cars off the road.

2. ***Invest in research and development for retrofitting existing power plants.*** Various schemes exist for sequestering carbon from coal plants. Much attention has been placed in both countries on producing a new generation of integrated coal-fired electricity plants which combine power production, capture of CO2 and sequestration. But even with successes in this new technology both countries will maintain huge fleets of existing plants in the short to medium term which must be retrofitted for capture and sequestration of CO_2 as well. Under the auspices of an already planned U.S.-China joint clean energy research center, the report proposes a strategy for research, development and deployment of a series of pilot facilities for CCS retrofits for existing coal power plants.

3. ***Catalyze markets for CCS.*** Private capital must be mobilized for the plants envisioned in step two by investing public funds and stimulating public-private partnerships. This stage of our roadmap focuses on the development of financial incentives for U.S. companies to invest in cooperation through a global carbon offset regime that includes proven CCS facilities and the creation of a global market for carbon abatement.

The Asia Pacific Partnership, and any funding to support such an initiative, can be useful in the context of such a long-term collaboration for concrete action. I would be pleased to provide you with a copy of this report.

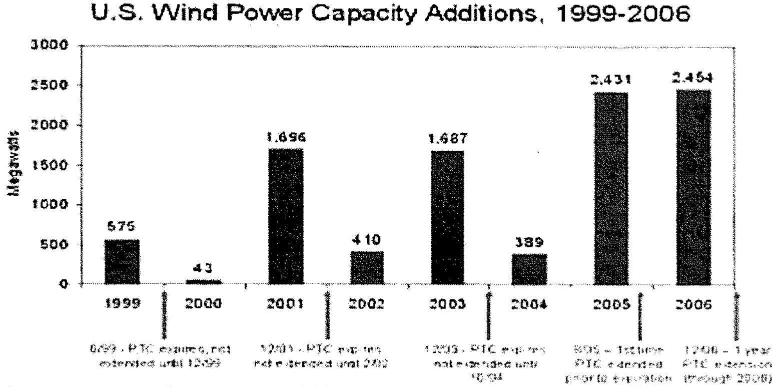
It is also absolutely critical that the Asia Pacific Partnership, bilateral arrangements between the United States and China, and even the Major Economies Forum on Energy and Climate, be viewed as complements, not substitutes, for the UNFCCC process. The UNFCCC, with its 192 member countries, remains the only forum broad enough in scope to create a binding framework for global action in carbon pollution reduction at the scale that the science requires.

2) Mr. Podesta - In your testimony, you also mention that we can do CCS projects faster and cheaper in China. Most people would argue that China can do every type of energy project faster, even renewable energy projects, because they don't have to deal with incredibly complicated, inefficient and burdensome environmental compliance regulations. I've even heard that stimulus money for renewable projects here in the U.S. is not being spent fast enough because the environmental reviews will take longer than the deadline for spending the money. Would you please discuss the degree to which our new

clean energy projects are being hampered by the time and cost posed by environmental regulations? Is there some common sense time frame that we should be expecting from environmental impact reviews? Is there something Congress should do to speed up these types of reviews? If China can accomplish these types of projects faster and cheaper now, how can we expect the U.S. to compete under a climate regime particularly if China doesn't agree to emissions reductions as well?

As you note in your question, "China can do every type of energy project faster." There are many reasons why this is generally the case, but the primary reason is not because it lacks environmental reviews – in fact, the Chinese government has improved its use of environmental impact assessment recent years. The key factor in the explosive growth in China's clean energy market is that its leaders provide straightforward incentives and clear policy directives to investors.

The United States, on the other hand, has failed to provide consistent market signals to the clean energy industry. The renewable energy production tax credit lapses are a perfect example of the effect this inconsistency has on investment. The chart below indicates the impact uncertainty surrounding the production tax credit has had on investment in the wind energy industry:



Source: American Wind Energy Association, 2007

Stricter U.S. environmental reviews may play a small role in the speed of project development, but decisions about siting and building renewable energy projects require scientific assessments to ensure that they do not threaten public health, or pollute air, water, or land.

One of the many benefits of scientific project reviews is that they can shape projects to minimize their impacts. The American Wind Energy Association states that:

> "the results of the critical environmental issues analysis often provide the developer with a better understanding of the site and the key issues that may

> require further investigation due to environmental concerns and/or regulatory drivers. The next stage of the development process often consists of conducting detailed environmental and land use studies to identify potential impacts and develop avoidance and mitigation strategies."[16]

An Executive Order in 2001 and the Energy Policy Act of 2005 both include measures that streamline the process for siting and building energy facilities, including renewable projects. And many renewable energy projects on private land do not require federal Environmental Impact Statements. The best information I have indicates that the average construction time of a wind project is 6-9 months,[17] and one to two years for a solar project. This is a much shorter construction period compared to fossil fuel and nuclear projects, which can take three to fifteen years to build.

There is no evidence that I am aware of that environmental reviews have significantly delayed clean energy projects under the American Recovery and Reinvestment Act. The Department of Energy has taken care to develop procedures for review and approval of grant applications. DOE and other federal agencies are proceeding with all deliberate speed to fund these programs while ensuring that the resources are spent as intended by Congress.

Additionally, Secretary of the Interior Ken Salazar has proposed to streamline the process for siting concentrated solar energy plants on public lands. DOI proposes to create "Solar Energy Study Areas [that] would streamline the environmental approval process on 670,000 acres of federal lands, accelerating the development of over 470 stalled renewable energy project applications." These projects could generate enough electricity to power nearly one-third of American households.

As of October 20, the Department of Energy has authorized $203 million of Recovery funds for renewable energy projects, including wind, solar, geothermal and biofuels projects.[18] Earlier this week, President Obama announced $3.4 billion for smart grid and transmission projects – which will leverage over $4 billion of private investment -- to update our aging electricity grid.[19]

Endnotes

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[1] Joseph Romm, "GOP proposes to cut solar technology funding and the clean energy jobs it would bring," Climate Progress, October 22, 2009, available at http://climateprogress.org/2009/10/22/gop-to-cut-funding-for-solar-technology-and-the-clean-energy-jobs-it-brings/.

[2] See Solarbuzz at http://www.solarbuzz.com/.

[3] Judy Dempsey, "Merkel confronts German energy industry with radical policy overhaul," *The New York Times*, July 4, 2009, available at http://www.nytimes.com/2007/07/03/business/worldbusiness/03iht-nuke.5.6473838.html.

[4] Giles Tremlett, "Gales set wind power record for Spain," *The Guardian*, March 6, 2009, available at http://www.guardian.co.uk/environment/2009/mar/06/spain-wind-power

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[5] Giles Tremlett, "Gales set wind power record for Spain," *The Guardian*, March 6, 2009, available at http://www.guardian.co.uk/environment/2009/mar/06/spain-wind-power

[6] Iberdrola Renovables website, at http://www.iberdrolarenovables.es/ (last accessed October 30, 2009).

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[14] Based on analysis in "Residential Energy Efficiency Workforce Needs in Massachusetts," New England Energy Council, 2009.

[15] Bracken Hendricks and others, "Rebuilding America: A National Policy Framework for Investment in Energy Efficiency Retrofits" (Center for American Progress and Energy Future Coalition, August 2009), available at http://www.americanprogress.org/issues/2009/08/pdf/rebuilding_america.pdf.

[16] American Wind Energy Association, *Siting Handbook*, available at http://www.awea.org/sitinghandbook/downloads/Chapter_2_Wind_Energy_Basics.pdf.

[17] This does not include acquiring project finances, which typically takes eighteen months.

[18] U.S. Department of Energy, "Recovery and Reinvestment," at http://www.energy.gov/recovery/ (last accessed October 30, 2009.

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Senator BOXER. Thank you. You got a lot in there, John. That was very well done.

Our next speaker is Ned Helme, President, Center for Clean Air Policy. Mr. Helme is the Founder and President of the Center for Clean Air Policy, with 25 years of experience in climate and air policy. And I understand you worked on the Clean Air Act amendments.

Mr. HELME. That is right.

Senator BOXER. A big success for us, a bi-partisan success. So please go ahead, Mr. Helme.

STATEMENT OF NED HELME, PRESIDENT, CENTER FOR CLEAN AIR POLICY

Mr. HELME. Thank you very much, Madam Chairman.

It is really a pleasure to be here. As you know, I am Ned Helme, President of the Center for Clean Air Policy. We are an environmental think tank based here in Washington. We also have offices in Brussels and Paris and New York and San Francisco and Beijing. We do a lot of work with a number of developing countries on the ground, China, Brazil, Mexico, Indonesia, et cetera. And we bring together the negotiators from the 30 key countries several times a year for off the record discussions helping to feed into the process that is going on this week in Barcelona and on into Copenhagen.

I want to make four points this afternoon. First, I think the myth of developing country inaction has finally been set aside. I can say with confidence the announcements we have seen from several countries in the last few weeks, the actions we have seen by China, Brazil, Mexico and others are quite substantial. We no longer have a question about whether developing countries are going to act or are their partners, trading partners going to act. They clearly are.

The second point I want to make is that Copenhagen is not Kyoto. We are in a different world. Kyoto was all about developing countries didn't have to take any action. Whatever action they did was really to help Annex I developed countries meet their targets by creating credits under the clean development mechanism. This new structure is going to create a shared responsibility. All the countries are going to be in the same boat. We are going to move forward together, a very significant change from where we were a decade ago.

The third point I want to make: competition for our key industries, the key piece of your legislation, S. 1733, I think it is critical in the transition period while we are getting China and Brazil and company up to speed, to protect our cement, steel, aluminum, the key industries that are highly internationally competitive, protect them in the interim while that transition is happening. And then once we have the transition, we can move forward in a complete program.

Finally, I want to say that it is very important that we do something on monitoring, reporting and verification. If we are going to make sure we are successful in protecting our companies, we need to know what is going on in every country. So we, as the U.S., need to support international standards to measure, report and verify what is going on in every country, not simply in Annex I countries.

Let me turn to the specifics. I have a table over here you can see, and it gives you a sense—you see the red column shows you China, Brazil and Mexico, three key developing countries. This is the net of reduction below business as usual they will achieve by 2010. So as you see, Madam Chairman, that number is nearly—it is larger than what we will do in Kerry-Boxer in 2015, and it is almost equivalent to what we will do with Kerry-Boxer in 2020. So that is action today on the ground, not for the clean development mechanism, action done by China, Brazil, Mexico, China doing a lot of things in terms of energy efficiency, in terms of renewables, in terms of vehicle standards, a very aggressive program; Mexico, some aggressive programs as well.

So I think this tells a story graphically. You can see the one on the far right, the blue is Europe and shows you that comparable, the action of those three countries by 2010 in terms of total tons, is quite comparable.

Senator BOXER. Do you have some charts that you can give us?

Mr. HELME. Yes, I can give you more detail.

Senator BOXER. If you would. And BAU stands for?

Mr. HELME. Business as usual, so the projected level they will be reaching.

Senator BOXER. Thank you.

Mr. HELME. Of course, you have to remember, Europe is under the Kyoto caps.

Senator BOXER. I do know. Yes.

Mr. HELME. That is different than us.

Senator BOXER. But I really need that, if you could get that.

Mr. HELME. I will be happy to do that, happy to do that.

OK, let me turn to my point about Copenhagen not being Kyoto. What we are seeing here is a shift where developing countries in the Bali Action Plan have agreed to take nationally appropriate mitigation actions, NAMAs, that will be monitorable, reportable and verifiable, specific actions across sectors, not just individual projects like they did in the CDM, but full scale programs in the cement industry and the steel industry and the electricity industry. And that will be monitorable, reportable and verifiable. And Annex I countries, the developed nations, are asked to help with some of the financing, the incremental costs to make that happen.

It is a new paradigm, very promising, looks like it has a good chance of being a part of what we get out of Copenhagen. I want to say, your legislation, S. 1733, is a perfect fit with this context because it provides the financing. By setting aside 7 percent of the allowances for R&D and for new technology and for adaptation, you are creating the financing part of this deal, which is really critical. And you are doing something significant, as you see here, in terms of the size of the reductions.

So the two things that really matter in Copenhagen are: Do we have a real target that is substantial? And are we helping developing countries move forward? I think the answer is yes. I would urge movement on this legislation as soon as possible.

Let me say a word about competitiveness. As I mentioned, I think it is key here that we protect our key internationally competitive industries. Your bill does that. It provides free allowances to cement, steel, aluminum, all the industries that are at risk. I think that is key. And I think what we will see from the Finance Committee will offer some border tax adjustments. So if after 2020, one country is dragging its feet, let's say India, we can stick that on that one country for that sector. So it is a much more targeted approach. I think that combination ensures the competitiveness, and that is critical.

My final point on monitoring, reporting and verification, if we are going to be careful, we are going to be sure that what we are doing is matched by others. We need international standards for monitoring, reporting and verification. We know in the U.S., EPA, our Government, will monitor, report and verify in this country. What we want to be sure of everybody else is doing that. And that requires that our delegation to the international negotiations supports international standards for monitoring, reporting and verification. That needs to happen, so that is a very key piece.

So let me close with one last point.

Senator BOXER. You need to close, yes.

Mr. HELME. Yes, one last point.

We have talked a lot about protecting existing industry. As John said, we also need to look at the industries of the future. China and Korea are eating our lunch today in these new industries. Your bill moves us in that direction. I think the single best thing we could do to move the legislation, move the Copenhagen situation, is to move the legislation here. So I commend you.

[The prepared statement of Mr. Helme follows:]

Testimony of Ned Helme
President, Center for Clean Air Policy (CCAP)
before the
Senate Committee on Environment and Public Works

Legislative Hearing:
The Clean Energy Jobs and American Power Act

October 29, 2009

Mr. Chairman, Ranking Member Inhofe, and Members of the Committee: I would like to thank you for the opportunity to testify before you today on S. 1733, the Clean Energy Jobs and American Power Act (CEJAPA). My name is Ned Helme and I am the President of the Center for Clean Air Policy (CCAP), a Washington, DC and Brussels-based environmental think tank with on the ground programs in New York, San Francisco, Mexico City, Beijing, Jakarta and many other places.

Since 1985, CCAP has been a recognized world leader in climate and air quality policy and is the only independent, non-profit think-tank working exclusively on those issues at the local, national and international levels. We are committed to advancing pragmatic and market-based climate solutions that balance both environmental and economic interests.

CCAP is actively working on national legislation in the United States (U.S.) and is advising European governments as well as developing countries such as China, Brazil, and Mexico on climate and energy policy. Our behind the scenes dialogues educate policymakers and help them find economically and politically workable solutions. Our Future Action Dialogue provides in-depth analyses and a “shadow process” for climate negotiators from 30 nations around the world to help them develop the post-2012 international response to climate change. It has produced important agreements among key nations on emissions trading, the design of the United Nations’ Clean Development Mechanism, and key features of the Bali Action Plan.

In our work with developing countries such as China, India, Mexico and Brazil, we have documented what these countries are already doing to reduce their emissions, what else they can do cost-effectively to reduce emissions, and how a new international agreement in Copenhagen can accelerate their progress. In our work in the U.S. we have been helping design climate legislation that will prevent jobs and their associated emissions in our energy intensive and trade sensitive industries from moving to other countries during the transition period when the major developing countries ramp up actions to level the carbon playing field. This includes transition assistance to U.S. industry as well as provisions to encourage further action by developing countries. We also are working to ensure that the U.S. legislation grows the green energy jobs of the future and ensures the U.S. is a global leader in the race to produce the world's future energy technologies. This the lens through which I offer my comments on S. 1733, the Clean Energy Jobs and American Power Act (CEJAPA).

My overarching message to you today is that it is absolutely critical to pass climate legislation as soon as possible. Passing CEJAPA, which places a cap on emissions and sets a market price for carbon, would take important steps to:

- protect the climate,
- improve energy and national security,
- drive innovation and investment needed to create the clean energy jobs of the future and ensure U.S. leadership in new energy technologies,
- and reach a global agreement this December in Copenhagen that includes meaningful action by developing countries.

By placing a price on greenhouse gas emissions and through various new incentive programs and policies, CEJAPA promises to jump-start U.S. innovation and investments in energy efficiency, carbon efficiency, and renewable energy across the economy. The bill authorizes EPA to establish new competitive grant programs, for example, to support high priority economic, environmental and energy goals and boost the competitiveness of the U.S. technology industry. Further, regulations like the renewable energy standard will result in additional new investments and bring down the costs of domestic production, enhancing the global competitiveness of U.S. industry in these important growth technologies.

In my time today, I would like to emphasize a four key points:

- First, other countries, including our key developing country trading partners, have announced and are implementing major actions to reduce emissions of greenhouse gases. China in particular is doing more than many believe to reduce the tremendous growth in their emissions and invest in the clean energy technologies of the future.

These actions represent an important start, but more reductions are needed for a solution to global climate change. Our goals should be to encourage more emissions reductions by all nations and to invest in our clean technology industries so we do not fall behind in the race to lead the market for new technologies. CEJAPA would do both.

- Second, we should be very clear, Copenhagen is not Kyoto. Unlike the Kyoto Protocol which allowed developing countries to participate on a voluntary basis, the agreement in Copenhagen is expected to require emissions reductions from developing countries. If the U.S. steps up with reasonable domestic emissions reduction targets and financial support for developing countries, developing countries are willing to take on new actions that are measurable, reportable and verifiable. The major roadblock to realizing this new shared responsibility is passage of CEJAP, as our climate negotiators are reluctant to put U.S. reduction and financial commitments on the table without Congressional action. Passage of CEJAPA, which includes international financing for reduced deforestation, international adaptation, and clean technology, would do more to raise developing country action than anything else the U.S. could do.

- Third, and very importantly, CEJAPA has provisions that will protect our domestic energy-intensive and trade-sensitive industries during the transition to significant reduction actions by China and other key developing countries.

- Finally, CEJAPA would create strong monitoring, reporting and verification (MRV) requirements for emissions reductions domestically. The U.S. legislation should seek to ensure that other countries meet equivalent standards by indicating our support for consistent international MRV standards which we will meet.

Developing Countries are Already Reducing Projected Emissions on a Level Comparable to Developed Nations

CCAP's extensive policy work in key developing countries has shown that developing countries are doing more to reduce the growth in their emissions than conventional wisdom here in the United States would suggest. China, Brazil and Mexico have already put in place national laws that collectively, if fully implemented, will reduce the projected growth in emissions by more aggregate tons in 2010 than CEJAPA (S. 1733) is projected to achieve by 2015 and by an amount comparable to the number of tons to be reduced by the European Union's 30 percent reduction pledge for 2020 (Figure 1).

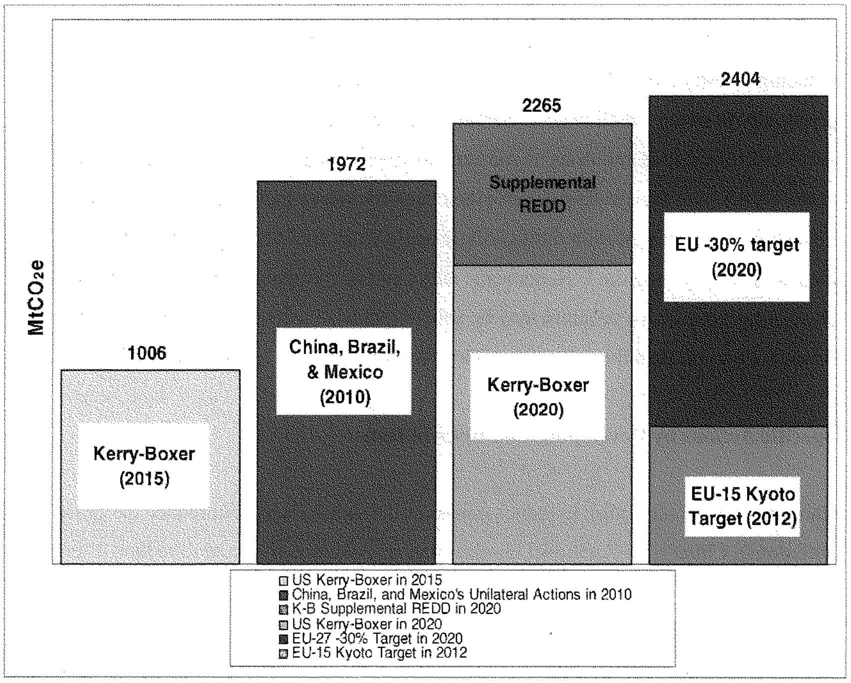

Figure 1. Emissions reductions from BAU for full implementation of proposed measures (CCAP, 2009).

CEJAPA would reduce emissions from capped sources 20 percent below 2005 by 2020. It also includes an additional 10 percent emissions reduction achieved by setting aside five percent of emissions allowances to purchase Reduced Emissions from Deforestation (RED) in developing countries. These additional reductions would not be a substitute or offset for emission reductions to be achieved in the United States. Instead, they would reflect a cooperative effort between the U.S. and key developing countries to make an additional contribution toward protecting the climate and would demonstrate our commitment to assisting those countries.

We strongly commend you for including the set aside for reducing deforestation because it has strengthened the hand of our climate negotiators and provided one of the most important positive signals the U.S. has been able to send to developing countries. The supplemental RED program has several advantages: it allows this new program for reducing forestry emissions to develop in a stable and orderly fashion; it avoids potentially flooding the allowance market with new forestry-based credits; and it also helps meet developed countries' commitments to provide financial assistance called for in the Bali Action Plan to help developing countries reduce their emissions. We also believe funding deforestation through these approaches could be cheaper and less risky than simply tightening the U.S. domestic target and allowing more offsets. It would be cheaper because such a program may be able to purchase reductions through up-front financing for less than the full market price for carbon.

Specific Actions by Developing Countries to Date

China has taken bold action to reduce emissions (which initially will reduce the growth of emissions). China's 2007 national climate plan set an aggressive goal to reduce its energy use per unit of GDP by 20 percent between 2006 and 2010. By the end of 2008, it had achieved half of this reduction target. If fully realized, this goal alone would reduce GHG emissions by more than 1.5 billion metric tons of CO2 from business-as-usual annually by 2010.

The plan also includes measures to increase the use of renewable and nuclear energy; recover and use methane from coal beds, coal mines and landfills; increase the development and use of bio-energy; utilize clean coal technologies; improve agricultural practices; and plant forests.

China is also on target to achieve energy saving of 100 million metric tons (Mt) of coal equivalent by 2010 through the Top 1000 Energy-Consuming Enterprise Program, which could translate to a CO2 emission reduction between 300 Mt and 450 Mt in 2010. This program has resulted in energy savings of 20 Mt and 38 Mt of coal equivalent respectively in 2006 and 2007 with a goal to save 20 Mt of coal equivalent in 2009.

To improve energy efficiency, China has shut down over 54 gigawatts (GW) of small coal-fired power plants between the beginning of 2006 and July 2009, exceeding the 2010 goal ahead of schedule. It plans to close another 31 GW of inefficient capacity between 2009 and 2011. Inefficient production capacity has also been phased out in the iron and steel, cement, aluminum, pulp and paper, and coke industries. For instance, the goal for iron, steel, and cement sectors is to phase out 100 Mt, 55 Mt, and 250 Mt of production capacity respectively by 2010.

China led the world in renewables investment in 2007 with over $10.8 billion; it is projected to displace Germany as the world leader in investment in renewables as a percentage of GNP in 2010. Its national goal is to increase the share of renewable sources in primary energy consumption to 10 percent in 2010 and 15 percent in 2020. Achieving the 2020 goal would be equivalent to a reduction of annual CO2 emission by 1.2 billion metric tons, according to China's "Medium and Long Term Plan for the Development of Renewable Energies," released in 2007. The actual development has exceeded the original plan and the specific goals in 2020 for some renewables have been significantly upgraded (the total renewable goal remains the same):

- For wind power, the original goal of 30 GW of total installed capacity has been raised to 100 GW after China quickly exceeded its initial 2010 goal;

- For solar power, the new goal is 10 GW which is more than five fold of the original target of 1.8 GW;
- For hydro energy, the focus was on small-scale generators, with a set target of 50 GW installed by 2010, and 75 GW by 2020. The 2010 target was reached well ahead of schedule, in 2006.

Although nuclear energy was excluded in the original plan, China now plans for nuclear energy to account for 5 percent of primary energy consumption in 2020 with total installed capacity slated to increase to 70 GW from the current 9 GW level.

Its vehicle efficiency standards are years ahead of the new U.S. standard. China has reached the 36.7 mpg standard and is considering a proposal to raise that to 42.2 mpg by 2015. In addition to direct regulation, economic incentives were utilized as well to encourage the production of more environment-friendly vehicles. Effective from the beginning of 2009, the automobile exercise tax rate on SUVs doubled to 40 percent while, for light vehicles with cylinder capacity less than one liter, the tax rate was reduced to one percent from three percent.

Many of these actions have been taken by China for good economic reasons which should give us confidence that implementation will continue. China has recognized, perhaps more quickly than we have, not only the economic benefits of expanded energy efficiency but also the global economic opportunity that taking the lead in these new markets can offer.

In his recent speech before the U.N. Climate Summing in September 2009, President Hu's promise of "reducing carbon dioxide emission intensity by a notable margin" also indicated that China will be shifting its focus on energy conservation to emission control. Although no quantified target has been announced yet, it is a strong signal that China is willing to take responsibility and slow down its carbon emission growth.

The Mexican government announced in late August major unilateral commitments to combat climate change. Their climate plan sets an aspirational goal of reducing long-term emissions by 50 percent from 2000 levels by 2050, proposes a cap-and-trade system between the oil industry and the electric industry by 2011 (potentially phasing in other sectors, such as cement and iron and steel, at a later date), and specifies a series actions that Mexico intends to take that are projected to reduce emissions by 51 MtCO2 (6.5 percent) from business-as-usual levels in 2012.

In addition, Mexico is putting in place many of the reforms needed to encourage implementation of key greenhouse gas mitigation options. CCAP's analysis has helped Mexico to define sectoral emission reduction goals and has demonstrated that the barriers to mobilizing many of the most promising mitigation measures in Mexico are domestic laws and regulations. Mexico has enacted significant reforms to remove these barriers, including new energy sector policies regarding fuel production and pricing, electricity pricing, and the promotion of renewable energy and efficient cogeneration. This has been accompanied by the creation of an Energy Transition Fund of three billion Mexican pesos a year for three years (about $210 million annually) to provide incentives for more aggressive emissions reduction activities. Even in the cases in which costs are a barrier to mitigation in Mexico, the barrier is generally the up-front capital costs, so the financial assistance required by Mexico to move these measures would be in the form of loans, not large grants.

The Mexican private sector's interest in climate change policy has grown dramatically this past year as well. The cement and iron and steel industries, in particular, have recognized this as an area of opportunity for their already efficient industries and have become more active in their interaction with the Mexican government. They are analyzing their options and considering the potential impacts of a domestic cap-and-trade program and other approaches.

South Africa has analyzed a number of long-term mitigation scenarios. It has announced its intent to peak its emissions no later than 2025, by among other things moving from traditional coal-fired electricity production to renewables, nuclear power and clean coal technologies, as well as improving energy efficiency and improving the efficiency of the transportation system.

Brazil has released a climate plan that emphasizes energy efficiency and reducing emissions from deforestation, including a goal to reduce the average deforestation rate by 70 percent over the period 2006-2017. It would lower CO2 emissions by about 413 million metric tons CO2 in 2010 (roughly 40 percent of the emissions reduction expected in CEJAPA by 2015) and by a total of 4.8 billion metric tons CO2 over the 12-year life of the program. In the last two years, Brazil has reduced deforestation by more than 250 million tons of CO2 equivalent through incentives for landowners and aggressive enforcement against those who deforest illegally.

South Korea intends to announce a long-term, economy-wide target for emissions reductions later this year. South Korea is already a global leader in the efficiency of its production in the major heavy industrial sectors, so its new effort will focus on domestic energy use and transportation-related emissions.

Copenhagen is Not Kyoto

The most common and widespread criticism of the Kyoto Protocol was that it did not require major developing countries to reduce their greenhouse gas emissions. Those concerns will be alleviated in Copenhagen, where a successor to the Kyoto Protocol is expected to ensure that developing countries take on more responsibility.

Under the Kyoto Protocol, developed countries assumed binding emissions reduction targets and the majority of the compliance costs to meet those targets. Developing countries, which faced no binding targets, were allowed to sell their emissions reductions (called offset credits) under the Clean Development Mechanism (CDM) to developed countries to help them lower the cost of their Kyoto protocol obligations. CDM offsets not only lowered the cost of compliance for developed countries, but also often made profits for developing countries, which collected more from selling the credits than it cost to reduce emissions. This was viewed as beneficial to both developed and developing countries.

The status quo, however, has changed and CEJAPA reinforces that change. It is now well understood that developing country emissions are growing fast, even though developed countries remain responsible for the lion's share of historical emissions in the atmosphere and have high per capita emissions. Given the projected growth in developing country emissions, we could not meet the international goal of cutting global emissions 50% below 1990 levels by 2050 even if we zeroed out developed nations emissions by that date. As a result, we know the only way to avoid the worst effects of climate change is for both developed and developing countries to take action simultaneously. It is also clear many major developing countries have been taking a surprising amount of action on their own to reduce emissions outside of the CDM as demonstrated in Figure 1.

The breakthrough in the international negotiations came recently, when developing countries acknowledged for the first time that they have some responsibility to reduce their emissions. Under the Bali Action Plan, agreed to in late 2007 by all the major parties including the U.S., developing countries agreed that they would be willing to take "nationally appropriate mitigation actions" (called NAMAs) that are measureable, reportable and verifiable, in exchange for financial and technological assistance that would also be measurable, reportable and verifiable. The international negotiations since Bali and leading up to Copenhagen are all about fleshing out how NAMAs and related financing should work to fundamentally and forever move us beyond the flaws of Kyoto. For developing countries, NAMAs make sense because they can be tailored to the needs and circumstances of each country. They can also accelerate the pace of financial and technological assistance, long sought by developing countries.

In implementing this new approach in the Copenhagen agreement, we have two important goals to balance. First, we need substantial emissions reductions below projected levels in both developed and developing countries by 2020. Second, we need to ensure the availability of offsets, which will help lower the cost of the developed countries climate programs. To strike this balance, it will no longer be possible to allow offsets to be simply the low-hanging fruit of project by project CDM. Instead, we will need to move to a sector crediting approach where offsets will need to be achieved on a sector-wide basis. For these reductions to generate offset credits, they will need to be above and beyond the domestic emission reductions that developing countries will be undertaking on their own or with some support.

The Structure of NAMAs and CEJAPA Will Raise the Bar on Developing Country Performance

The evolving analyses of NAMAs and sectoral approaches suggest an architecture that can achieve greater GHG reductions, leverage public financing, and minimize potential trade impacts. In the current international negotiations three general types of NAMAs are being considered: unilateral, supported, and credit-generating. The first two are contributions from developing countries and the last is offsets.

Unilateral Actions would be directed toward win-win actions. Since the actions are estimated to be profitable even in the absence of a carbon price signal, the developing country could presumably undertake these actions without financial assistance, taking steps to overcome barriers that may have kept this from happening already. Developed country assistance, if needed, could come in the form of technical assistance, capacity building, and supply of technology, equipment, and financing at market rates. Many of the aggregate reductions shown earlier in Figure 1 fall into this category.

Supported NAMAs would be directed toward the lower-cost mitigation actions and would be eligible for some up-front financing from developed nations for the incremental costs of the action. By financing only the incremental costs (or a portion thereof) of these actions, developed countries can avoid any adverse impacts on the competitiveness of their industries. These reductions are a joint contribution to the protection of the atmosphere. They do not offset developed country reduction requirements.

Sectoral Crediting (or offsets) are actions that reduce emissions sector-wide below a predetermined and negotiated baseline, which makes a developing country eligible to sell offsets to developed countries. These would be directed toward the higher-cost actions, and would follow the adoption of unilateral actions and supported NAMAs. Additionally, since this approach is likely conditional upon unilateral actions and supported NAMAs, the developing country has an incentive to take these first two steps in order to partake in the financial benefits of the offsets market, and thereby increase its overall contribution. .

We believe that this tiered approach to international action can balance our two goals for a Copenhagen agreement, enabling offsets that can support strong domestic commitments that are environmentally effective and economically wise, while simultaneously encouraging strong international commitments by both developed and developing countries. Such an architecture can not only avoid the troublesome effects of adverse shifts in trade competitiveness and greenhouse gas leakage, but also encourage policies that help to level the carbon playing field and better allow countries to adopt tougher environmental measures with greater economic confidence.

For Developed countries, the new architecture:

- Changes the game from the old CDM where all emission reductions were paid for by developed countries. Developing countries are bearing the bulk of NAMA costs.
- Achieves more emissions reductions sooner by developing countries. Developing countries will be responsible for reducing emissions on their own and have built-in incentives to do more.
- Would set strong standards for monitoring, reporting and verification.
- Helps competitive industries in developed countries. With developing country industries assuming new emission reduction commitments and costs, the gap in

> carbon costs between the U.S. with a carbon cap and developing countries without one will begin to narrow.

The international offsets and financing provisions in CEJAPA align well with the NAMA approach. The sponsors deserve credit for designing a system that creates up-front financing for supported NAMAs and for reductions in deforestation via the allowance set-asides for Reduced Emissions from Deforestation (RED) and clean technology. This makes clear the U.S. is committed to helping developing countries move aggressively to implement policies to reduce emissions, consistent with the Bali Action Plan. In addition, the provisions directing the Secretary of State to designate sectors in the emerging economies where offsets can only be earned if a sector-wide crediting program is in place are a key innovation. This moves us beyond the project by project approach of the CDM to a comprehensive approach where all facilities in a sector need to participate in emission reductions. We would suggest that the language of this section make clear that after 2016 any crediting for emission reductions in these sectors be beyond the level of reductions achieved by supported NAMAs, with no continuing opportunity for traditional CDM projects in these sectors. In sum, CEJAPA positions the U.S. to play a very constructive role in the design of the Copenhagen agreement.

Financing for developing countries

One of the ways the U.S. and developed countries will be judged in Copenhagen is by whether they provide meaningful financing, technology and capacity building assistance to developing countries as they agreed to consider in the Bali Action Plan.

Whether financing is for deforestation or clean technology deployment, some observers incorrectly assume that any financing agreement in the Bali Action Plan must mean large unrestricted amounts of funding. However, the behind the scenes negotiations are more likely to focus on specific and tailored financial mechanisms like support to "write down" the cost of advanced but not yet commercial technologies like carbon capture and storage, and financing for special purpose entities that can help overcome resistance from banks in developing countries to make financing available for energy efficiency. As we have seen with Mexico's recent proposals for caps in key internationally competitive industrial sectors, the financing element comes down to targeted loans that help overcome domestic policy barriers. Availability of such financing will provide the incentive for participating developing countries to establish more aggressive "performance goals." This approach also creates opportunities for leading U.S. companies to gain access to growing new markets (creating jobs at home) and moves toward leveling the playing field for carbon in internationally competitive sectors.

International Competitiveness

CEJAPA protects our domestic energy-intensive and trade-sensitive industries during the period when China and other leading developing countries are stepping up their national actions. We all have concerns about the impact on energy intensive and trade sensitive industries, such as iron and steel, cement, etc., where energy costs are a significant portion of the production costs and face international competitors which may not face a carbon price. CEJAPA solves this problem by allocating approximately 15 percent of allowances for free to these industries through 2025, with the allowances phasing out 10 percent per year through 2035. EPA's analysis of this approach in the American Clean Energy and Security Act (HR 2454) suggests that this will either fully compensate these industries or come very close to doing so for the direct costs of purchasing emissions allowances and for any increases in their indirect energy costs. These allowances provide more than 20 years of transition assistance while developing countries take more action. Although the bill does not include a border tariff, which is in Finance Committee jurisdiction, it is expected that there will also be a border adjustment on imported products from countries which have not taken sufficient action by 2020. Together, the free allowances and the border tariff backstop provide the protection U.S. industry may need.

Transparent System for Monitoring, Reporting and Verifying National Actions

To meet our goals of making an appropriate national emission reduction contribution to the global goal of holding temperature increases to 2 degrees centigrade, encouraging further developing country action, producing needed international offsets to help contain domestic costs, and protecting the competitiveness of domestic industries, we need to ensure that there is a transparent domestic and international system for monitoring, reporting and verifying national actions, emissions and offsets.

The only assurance we can have that others are doing their part is a system whereby every country reports transparently in accord with consistent international standards on their annual emissions, how many offsets they are recognizing, the nature of those offsets, and the degree to which they have complied with the emissions reductions goals they have set.

The legislation before you does a good job of ensuring that EPA and other agencies will create a transparent domestic system, and could go a little further to ensure the creation of similar, transparent standards in any international agreement. In addition, it would be helpful to clarify that that the U.S. should report on our domestic actions in a way consistent with any international standards for reporting, so we can send a message that all nations must report consistently, which is the best way to verify that all countries and their industries are doing what they say they are doing and to ensure that the competitiveness of U.S. industries is protected.

In closing, I want to underline that the bill before you positions the United States effectively to make an important contribution to closing the deal at Copenhagen or shortly thereafter. The actions taken by the majority of the key developing countries coupled with the recent bold steps taken by Japan and India make clear that we no longer need to question whether others will act. The provisions in this bill and in the companion bill passed by the House will provide protection and assurance for our internationally competitive industries during the transition to full implementation of national climate actions by our major developing country trading partners. We now need to shift our focus to the future competition for leadership in the new clean energy marketplace. This bill makes that shift. We simply need to pass it as soon as possible.

Senator BOXER. Thank you so much, Mr. Helme.

And next speaker is Jonathan Lash, the President of the World Resources Institute. Mr. Lash has been President of the Institute since 1993, and we are very pleased to have you here.

STATEMENT OF JONATHAN LASH, PRESIDENT, WORLD RESOURCES INSTITUTE

Mr. LASH. Thank you, Senator Boxer, Senator Inhofe, Senator Klobuchar. I have appeared before you a few times before as a representative of the United States Climate Action Partnership, but today I am here on behalf of the World Resources Institute, not USCAP.

If we are to achieve the goal that was agreed to last summer by the U.S. and other major economies of limiting warming to 2 degrees, then the U.S. needs to act immediately to reduce its own greenhouse gas emissions, and it must negotiate a global agreement that commits other nations to do so.

Senate passage of S. 1733, or legislation like it, would represent a crucial step toward both goals. It would lay out an ambitious road map for U.S. emissions reductions. It would catalyze innovation and create jobs. But it would also enable us to take advantage of significant new actions and commitments by other countries to control their emissions.

Locking in those commitments by other countries would be in our economic, security and environmental self-interest. Almost every country which is a significant source of greenhouse gas emissions, developed and developing, has in recent months taken actions or made significant proposals for emissions reductions. Mexico pledged to reduce emissions by 50 percent by 2050 using a cap and trade system.

Brazil pledged to reduce deforestation, which is responsible for most of its emissions, by 70 percent. South Africa has offered a detailed plan of policies to peak and begin to reduce its emissions by 2020, astonishing for a poor nation. Japan proposed to reduce emissions 25 percent below 1990 levels by 2020 if other nations act.

And as you know, President Hu Jintao of China in the first speech by a Chinese head of state to the United Nations, pledged to reduce China's carbon intensity over the coming years by a notable margin in addition to the 20 percent improvement in energy intensity that they will have achieved by 2010.

Nations that had for years insisted that reducing emissions was solely the responsibility of industrialized countries are now signaling, in the words of Environment Minister Ramesh of India, "We may not have caused the problem, but we have to be part of the solution."

But how much do these commitments mean? In my written testimony, I provided a detailed summary of actions and commitments by other countries. But can we count on them to do what they say they will do? Can we verify that they are doing what they say? I would like to focus on that point and why I believe the answer is yes.

Twenty years ago when President Reagan negotiated nuclear arms reductions with Russia, he quoted the Russian proverb "Trust, but verify," not because he trusted Russia, but because he didn't. The treaty he signed provided the means for verification, the issue that Mr. Helme was referring to.

Whether or not we start with trust of other nations, multiple redundant tools are available to verify action and outcomes. Verification is feasible, and provided it is included in the agreement, that agreement can be the basis for trust. We have broad experience with both developed and developing nations in international verification. Examples include the Montreal Protocol, the Nuclear Nonproliferation Treaty, the WTO, IMF. None is perfect. They all have flaws. But each of them provides a basis for the United States to assert its interests and monitor the actions of other countries.

U.S. Governments are on the ground working on energy and environmental policy implementation and reporting in most of the countries of concern. We can reap benefits by taking advantage of this capacity. U.S. EPA, for example, has worked in China on successful efforts to improve control of SO_2 and is beginning to work on greenhouse gas emissions, a program that we are involved with.

There are multiple outside sources for cross-checking national energy and emissions data, including not only U.S. Government experts, but those of Europe and Australia and a broad array of academic institutions that have specialized in that area.

And finally, the capabilities of satellite systems are extraordinary. My own organization has a decade of experience tracking deforestation around the world using satellite data. We can show you an individual tree being illegally harvested in the Congo basin.

Verification is feasible, but it depends on completion of an international agreement. We can collaborate with rapidly growing developing countries to reduce global emissions, create new markets for low carbon technologies and services, and guarantee that the competition for those markets takes place on a level playing field. But international progress depends on U.S. domestic progress on pending legislation.

U.S. commitment is a pre-condition for international agreement, and international agreement will make U.S. action both more effective and more secure—the two reinforce each other. The United States has led the world through great economic and social changes. It has thrived by doing so. This is an occasion for leadership once more.

Thank you.

[The prepared statement of Mr. Lash follows:]

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TESTIMONY OF JONATHAN LASH
PRESIDENT, WORLD RESOURCES INSTITUTE

HEARING BEFORE THE UNITED STATES SENATE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
"LEGISLATIVE HEARING ON S. 1733,
CLEAN ENERGY JOBS AND AMERICAN POWER ACT"

OCTOBER 29, 2009

"Getting to Yes on Climate Change – Action of Other Countries"

Good afternoon and thank you for inviting me to testify today regarding the pending legislation, action of other countries to address climate change, and the implications of their action for the United States.

I am Jonathan Lash, president of the World Resources Institute. WRI is a non-profit, non-partisan environmental think tank that goes beyond research to provide practical solutions to the world's most urgent environment and development challenges. We work in partnership with scientists, businesses, governments, and non-governmental organizations in more than seventy countries to provide information, tools and analysis to address problems like climate change, and the degradation of ecosystems and their capacity to provide for human well-being.

I have a single message to deliver today: The time is ripe for Congress to enact climate legislation to reduce emissions, establish energy security, and create new jobs in clean energy. Other nations are moving; the outcome depends on us.

We need global action to solve this global problem. Those who have worried that the United States might act alone need worry no more. The worry should be that without us, the rising global effort will falter. The worry should be that if we hesitate, we will miss the opportunity to lead the coming clean energy revolution.

With other nations acting, U.S. action now can make the critical difference.

Other countries across the globe are moving to take action to confront global warming. This has transformed the debate over this issue. The time is ripe for the United States to act and it is in our own interest to act promptly. In a nutshell, there are three reasons for this:

- Action by other countries increases opportunities for the United States if we are prepared to seize these opportunities.
- Steps by other countries help ensure that the United States will not be disadvantaged by taking action itself.
- Action by the United States is essential to cement an agreement under which all countries commit to continue and increase the steps they are taking.

In order to take action, we need a better understanding of what we are facing. We need to understand the opportunities. We need to put aside old myths. We need to focus on the real problems and recognize the solutions to those problems. And we need to get busy so we do not miss this opportunity.

A changed landscape

As illustrated by Figure 1, almost 80 percent of global emissions are produced by fifteen countries (counting the European Union as a single country). A majority of these are developing countries, which, until recently, said they would not take action on emissions without clear action by wealthy countries. At the same time, all countries have recognized that the poorest would need assistance in deploying clean energy and preserving forests and also in adapting to minimize the damage from changes in the climate that are no longer avoidable. What has changed is that in the last couple of years, and even in the last few months, without waiting for rich nations to act, countries such as China, India, Brazil, Mexico, and South Africa are stepping forward with significant proposals and actions.[1]

As explained below, China provides an important example among developing nations, but China is not alone. Mexico has pledged to halve its greenhouse gas emissions by 2050, employing a "cap-and-trade" policy like the one under consideration in the U.S. Congress. South Africa has presented a detailed plan to peak its national emissions by 2020. India has defined eight national missions in efficiency, renewable energy, and sustainable agriculture and ecosystems and is developing strategies in these areas. Recently, the Indian government announced it will offer new legislative proposals to tighten fuel efficiency standards and pursue other clean energy targets, and there have been indications of increased willingness to subject its actions to review. Deforestation accounts for about two thirds of Brazil's greenhouse gas emissions. Brazil has said it would reduce its deforestation rate 70 percent from recent levels by 2017.

Among developed countries, a new government recently came to power in Japan, transforming that country from a laggard to a leader with an ambitious proposal to reduce emissions 25 percent below 1990 levels by 2020 if other major countries take ambitious action. The European Union position is that it will reduce its emissions by 20 percent regardless and by 30 percent if other developed countries take sufficient action. And Australia, heavily dependent on coal for consumption and exports, has said that it will cut its emissions by 25 percent below year 2000 levels if others take on similar actions.

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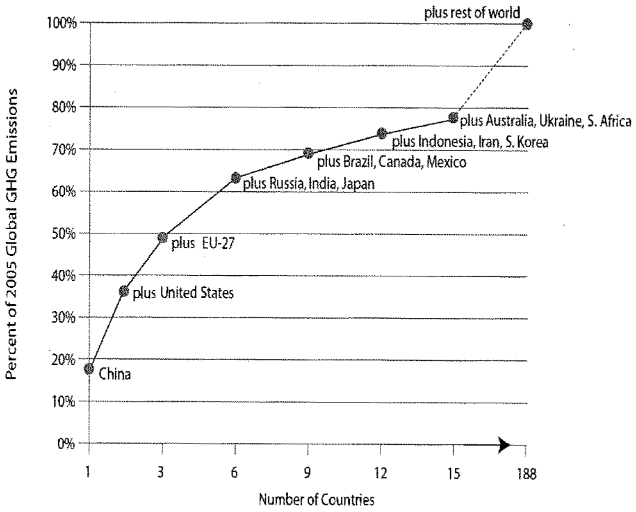
[1] *See* annex to this testimony, "National Climate Change Strategies" (WRI June 2009). New measures are emerging almost daily. See, for example, Rie Jerichow, "India and China sign major agreement on combating climate change." Oct. 21, 2009, http://en.cop15.dk/news/view+news?newsid=2400. For the text of the India-China MOU, see http://moef.nic.in/downloads/public-information/India-China%20Agreement%20on%20Climate%20Change.pdf.

Figure 1: Aggregate GHG Emissions by Country, 2005



Sources & Notes: WRI, CAIT. Percent contributions are for year 2005 GHG emissions only. Moving from left to right, countries are added in order of their absolute emissions, with the largest being added first. Figures exclude emissions from land-use change and forestry and bunker fuels. Adapted from Figure 2.3 in Baumert et al. (2005).

The ball is now in our court, and it is in our interest to act. In December, the nations of the world will meet in Copenhagen, Denmark to try to reach agreement on plans to confront climate change. In order to reap the benefits of an agreement, we need to bring something credible to the table. That something is what this committee and this Congress write into legislation.

Let me explain what is at stake by focusing on China. China is a country taking action and looking at China helps us understand the problems, solutions, and opportunities before us.

The case of China

Some people have worried that action by the United States on climate change could put us at a competitive disadvantage if countries like China do not also take action and produce at lower cost. In fact, China *is* taking action, which can help assure that there is a level playing field. As I will explain, they are doing this because it is in their own interest, which should give us confidence they will continue. Instead of more delay, we should get an agreement that helps further to ensure that Chinese action on climate will continue and increase. But there is more. Not only should we lock in a commitment; we should work with China to reap the benefits of the new economic future emerging in the worldwide shift to clean energy.

Here are the facts. In 2005, realizing its growth in energy consumption was unsustainable for energy and climate security reasons, China launched a plan to reduce energy intensity 20 percent from 2005 levels by 2010. This may be the largest greenhouse gas mitigation program of any country. China also plans an increase in renewable energy to 10 percent by 2010. In 2007, China was second in the world in funds invested in renewable energy.

China, like the United States, is a major user of coal. However, China is closing inefficient coal plants, deploying state-of-the-art or better technology, and exploring carbon capture and storage (CCS) technology. These efforts can help improve coal technology and bring down the costs. U.S. – China collaboration on development of CCS and other coal technologies is already underway and opens vast opportunities.

At the Major Economies Forum in July, China and India for the first time agreed at the international level to a declaration to take action to meaningfully reduce emissions below business as usual, peaking as soon as possible. Also, they recognized the scientific view that temperatures should not exceed 2 degrees Celsius above pre-industrial levels.

In the first-ever speech by a Chinese President to the UN General Assembly in September, 2009, President Hu Jintao said China will reduce its carbon intensity by "a notable margin" by 2020.

Why are they doing this? – "All politics is local."

China's aggressive action to improve energy efficiency and reduce emissions is not an act of global charity. China's leadership realizes they cannot maintain growth and reduce poverty without conservation of resources. Pollution is choking off growth and producing social unrest. Adverse impacts from climate change are projected to undermine agricultural productivity and cause flooding in south China and along the coasts.

Qi Ye, deputy director of the China Sustainable Energy Program in Beijing says you have to "address the global issue in terms of local need" because people act on what they care about. Similar sentiments can be heard in other developing countries. In describing India's new initiatives on clean energy, the Indian environmental minister said recently, "I want to be aggressive, because, frankly, we are a country that is climate dependent" because of rising seas and monsoons. "We may not have caused the problem, but we have to be part of the solution."

How do we know they're doing what they say? "Trust but verify."

Self interest in taking action to confront climate change affords us some confidence that countries like China will follow through. Still, challenges remain. Reliable data are not always available and standards of enforcement, governance and transparency are variable. This is one of the reasons it is in our own interest to establish an international climate agreement. A key element in the negotiations is creation of a system for measuring, reporting, and verifying actions to give confidence that promises are being kept and action taken.

Just as President Reagan suggested to Soviet leader Gorbachev in signing the nuclear arms reduction treaty and quoting the Russian proverb "trust but verify," trust is fine, but real confidence depends on verification.

Verification of China's action to reduce emissions will be feasible. China participates in peer review and verification already under international agreements like the WTO and the Montreal Protocol to address ozone. The U.S. Environmental Protection Agency has worked with China in successful efforts to improve its control of sulfur dioxide emissions. China has already begun collecting and verifying energy data. Moreover, the United States could invest in satellite tracking as an additional way to help check up on whether China is meeting its commitments.

China and the United States – solving problems, seizing opportunities.

Some people have worried that China would steal American jobs by competing using dirty production processes. The reality is China is pulling ahead of us by being innovative and clean. If doubts remain, a global climate agreement can allay them by ensuring action by all that will help level the playing field. As a fallback, the House-passed climate bill protects energy-intensive U.S. industry by providing free allowances to comply with cap-and-trade, in the form of output-based rebates. When the rebates phase out a decade from now, the president is authorized to impose border duties if action by China and other countries has not done enough to level the playing field.

In September 2009, *The Wall Street Journal* said that a group of Western firms published a report anticipating a $500 billion to $1 trillion market annually in China for clean technology. In August and September, America's third largest coal fired electric utility, Duke Energy Corp., announced agreements to explore clean energy and carbon capture projects with Chinese companies. In July, the U.S. and Chinese governments signed an MOU for joint research collaboration.

The opportunities are there in the vast Chinese and global markets and in collaboration with the Chinese and others in the private and public sectors. But to take advantage of the opportunities, the United States will have to get its act together to promote clean energy. We risk falling behind if we don't move forward. Climate legislation is key because, by putting a price on carbon, it shifts investment into clean energy. The pending legislation also contains important new financial support for clean energy development, clean technology exports, and carbon capture and storage technology. Additionally, it creates economic opportunities in international carbon trading.

Getting it in writing – U.S. legislation and a global agreement.

Now what we need is a global agreement, confirming and strengthening the new trajectory of China, India and others. To realize the benefits of a global agreement, the United States needs to take action – better yet, take action and take the lead – to make the global agreement possible.

Both warming and the emissions that cause it are global. The economy, trade, and competition are global. A global agreement provides a basis on which countries can act with some confidence that others will do so as well. It can address issues of verification, competitiveness, and fairness, and it can create new opportunities for collaboration on clean energy.

In order to get that global agreement, Congress needs to take action on climate legislation so our negotiators can go to the negotiating table with what the United States will do – what emissions reductions we will achieve and what assistance we will provide to help less developed countries shift to clean energy and adapt to climate change.

U.S. negotiators have made clear that they will not commit the United States to greenhouse gas reductions and other critical points without a clear expression of political will by Congress. At the same time, other countries have expressed understandable reluctance to complete an agreement without a commitment from the United States. Thus, until Congress acts on U.S. legislation, the world cannot reach final agreement.

Only if all nations come forward with what they propose to do is agreement possible. The question is no longer whether others will act. They are acting. The question is whether we will act. The point is no longer that global warming cannot be addressed without those other countries. The point is that it cannot be addressed without this country and that we cannot gain the benefits of leadership unless we enact climate legislation.

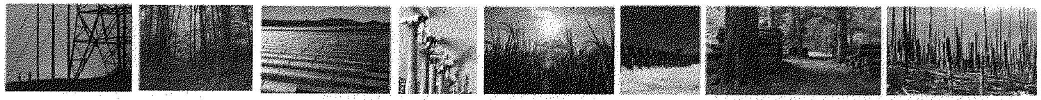
Then we can not only avert the threat of dangerous global warming; we can reap the benefits of new jobs, economic growth, and energy security in the age of clean energy.

The United States has led the world through great economic and social changes and has thrived by doing so. This is an occasion and an issue on which the world again needs that leadership.

ANNEX

NATIONAL CLIMATE CHANGE STRATEGIES:
COMPARATIVE ANALYSIS OF DEVELOPING COUNTRY PLANS

WORLD
RESOURCES
INSTITUTE



	INDIA National Action Plan on Climate Change (NAPCC)	BRAZIL National Plan on Climate Change (PNMC)	CHINA National Climate Change Program	MEXICO Special Program on Climate Change (PECC)	SOUTH AFRICA Long Term Mitigation Scenarios (LTMS)
Issuing entity	Prime Minister's Council on Climate Change, July 2008	Inter-Ministerial Committee on Climate Change, December 2008	National Development and Reform Commission, June 2007	Inter-Secretarial Commission, March 2009 (review draft)	Cabinet of South Africa, July 2008
Stated objective	To establish an effective, cooperative and equitable global approach based on the principle of common but differentiated responsibilities and relative capabilities; to identify measures that promote development objectives while yielding co-benefits for climate change.	To identify, plan, and coordinate the actions and measures that can be undertaken to mitigate GHG emissions in Brazil, as well as those necessary for the adaptation of society to the impacts that occur due to climate change.	To make significant achievements in controlling GHG emissions; to enhance the capability of continuous adaptation to climate changes; to promote climate change related science, technology and R&D to a new level; to raise public awareness on climate changes; and to further strengthen institutions and mechanisms on climate change.	To develop and solidify guidelines contained in the previously released National Strategy on Climate Change (ENACC); to demonstrate that it is possible to mitigate and adapt to climate change without compromising development, while reaping economic benefits.	To produce a sound scientific analysis from which Cabinet could draw up a long-term climate policy; to give South African negotiators under the UNFCCC clear and mandated positions; to ensure that South African stakeholders understand and commit to a range of realistic strategies for future climate action.
Process for development	Plan developed by a special council appointed by the Prime Minister. Efforts began in 2007. Council includes ministers, government officials, scientists, civil society and business, but has met infrequently. As of 2009, strategies to advance the eight missions identified in the plan are being developed by ministries, agencies and consultants. The need for further stakeholder engagement has been recognized.	President initiated PNMC in April 2007 on the recommendation of the Ministry of Environment and Brazilian Forum on Climate Change. In November 2007 President appointed Inter-Ministerial Committee on Climate Change (CIM) to oversee Plan. CIM surveyed ministries to identify actions that could be incorporated and solicited input through a stakeholder consultation process. Initial version released for public comment in September 2008; criticized for lack of clear goals. Revised version released December 2008.	China was the first major developing economy to issue an action plan. Process was led by the National Development and Reform Commission, with input from leading universities. Chinese Vice Premier Zeng Peiyan and State Councilor Tang Jiaxuan now head a National Coordination Committee on Climate Change, which includes 17 ministries and agencies, to orchestrate climate change policy.	Inter-Secretarial Commission on Climate Change (CICC) formed in April 2005. CICC prepared ENACC, presented by President Calderón in May 2007, who ordered development of the PECC based on ENACC and the National Development Plan (PND). 17 sectoral reviews fed into PECC. An initial draft was published in July 2008 and was subsequently revised based on a new set of GHG mitigation scenarios.	Commissioned by Cabinet in 2006; Department of Environment and Tourism tasked to develop plan. A "Scenario Building Team" was set up, including research institutes, business, and civil society.

June 2009. *Compiled by Taryn Fransen, Smita Nakhooda, Eric Chu, and Heather McGray. Contact Taryn Fransen: tfransen@wri.org.*

	INDIA National Action Plan on Climate Change (NAPCC)	BRAZIL National Plan on Climate Change (PNMC)	CHINA National Climate Change Program	MEXICO Special Program on Climate Change (PECC)	SOUTH AFRICA Long Term Mitigation Scenarios (LTMS)
GHG emission scenarios framing plan	Notes that there is evidence of climate change, and references the IPCC reports. Makes a commitment that Indians' emissions per capita will not exceed those of people in developed countries.	Cites the IPCC as scientific consensus that anthropogenic climate change is occurring. Presents national emissions data from 1994. States that Brazil has contributed little to the problem (in terms of comparative per capita and per area emissions). Mentions that Brazil will not wait for others to act to mitigate climate change, and characterizes its actions as ambitious relative to those of others. Frames actions in the plan in terms of contribution to efficiency of the economy.	Makes reference to IPCC and Stern reports to confirm the need for early action on the part of all countries to reduce emissions. Notes that emissions intensity is falling. Emphasizes China's right to development, and the need to consider developing country emissions on a per capita basis.	Presents national emissions data from 2006. Establishes long-term vision, including national GHG reduction target of 50% below 2000 levels by 2050. Target stems from OECD estimate of maximum annual global and per capita emissions compatible with 450 ppm by 2050. Notes that Mexico's emissions need to peak by 2012 to meet target. Considers cost curve analysis identifying low- and no-cost actions. States that reaching target depends on international support.	Developed with reference to emission scenarios if growth were "not constrained," and emission levels "required by science" to prevent climate change. The actions identified in the LTMS are to reduce emissions to the levels required by science.
Overview and scope	Defines eight national missions: Solar, energy efficiency, sustainable habitat, water, Himalayan ecosystem, green India, sustainable agriculture, and strategic knowledge. Outlines institutional arrangements to achieve missions. Addresses adaptation as well as mitigation.	Covers energy (renewable/clean energy, biofuels, consumption reduction, oil and gas); forests and agriculture (ecosystem conservation, agriculture and ranching, strengthening sinks); and other sectors (industry, waste, transport, and health). Plan lists 32 activities in implementation and 13 activities in the "conception phase." Addresses mitigation, adaptation, R&D, and education and communication.	Covers energy production and transformation, energy efficiency, industrial processes, agriculture, forestry, and waste. Addresses mitigation, adaptation, science and technology, public awareness, institutions and mechanisms, and international cooperation.	Covers energy generation; energy use; agriculture, forests, and other land uses; waste; and private sector. Contains 41 mitigation objectives and 95 related targets. Targets are framed in terms of both quantitative and qualitative metrics. Most have a 2012 deadline; some are framed in terms of GHG reductions. An annex identifies responsible agencies and strategies. Addresses mitigation, adaptation and cross-cutting policy.	Identifies measures to reduce emissions and adapt: activities to "start now" as they will save money over time; measures to scale these actions up with additional resources; tax and incentive packages; and parallel options, e.g. behavioral changes and generation technologies. Considers energy and non-energy emissions, macro-economic analysis, and climate impacts. Addresses mitigation only.

	INDIA **National Action Plan on Climate Change (NAPCC)**	**BRAZIL** **National Plan on Climate Change (PNMC)**	**CHINA** **National Climate Change Program**	**MEXICO** **Special Program on Climate Change (PECC)**	**SOUTH AFRICA** **Long Term Mitigation Scenarios (LTMS)**
Examples of proposed mitigation interventions	*Energy generation/use* • Increased deployment of solar PV, 1,000 MW of concentrating solar thermal power • Energy efficiency in industries, small enterprises, energy production, residential sector • Promotion of ESCOs and retrofits • Regulate power tariffs for irrigation • Retire or rehabilitate 10,000 MW old capacity • RD&D of supercritical coal • Promote nuclear power (closed cycle technology) • Exploit hydropower potential (large, medium, micro) • Explore dynamic minimum renewables purchase standard starting in 2009-10 *Transport* • Urban public transport • Transport pricing reform and higher regulatory standards *Forests* • Expand forest cover to 1/3 of country's area • Additional afforestation programs	*Energy generation/use* • Add 7,000 MW of renewable energy from bagasse cogeneration, mini-hydro, and wind; increase bagasse cogeneration to 136 TWh (11.4% of energy mix); add 34,460 MWh from hydro • Solar water heating to reduce energy needs by 2200 GWh/year *Transport* • Increase share of rail and water transport; improve mass transit, bicycling, and river cargo *Forests* • Reduce deforestation by 40% by 2009, and an additional 30% by 2013 and 2017; eliminate illegal deforestation • Complete a carbon stock inventory and national public forest registry • Eliminate net loss of forest cover including by doubling area of forest plantation to 11 million ha by 2020, and increasing annual planting *Waste* • Recuperation of methane from landfills • Increase urban solid waste recycling by 20% by 2015	*Energy generation/use* • Reduce energy consumption per unit GDP by 20% • Accelerate institutional reform • Foster bioenergy and renewables, including wind, solar, geothermal and tidal • Develop hydropower resources • Promote nuclear power • Ultra-supercritical coal; methane bed, and mine methane technology • R&D for efficient coal mining, oil and gas exploration and use technologies • Improve efficiency standards, programs and implementation • New financing mechanisms and tax policies to promote energy savings • Most efficient technologies for iron and steel; cement; oil and petrochemical; agricultural machinery industries	*Energy generation/use* • Design and operate a carbon market between para-state companies in the energy sector • Reduce emissions from natural gas injection • Enhance cogeneration • Promote natural gas projects • Promote additional investment in renewable energy *Transport* • Increase the share of rail in cargo transport *Agriculture* • Improve pasture management *Forests* • Promote sustainable forest management • Design, pilot and implement REDD projects *Waste* • Reduce emissions from landfills	*Energy generation/use* • Accelerated energy efficiency and conservation across all sectors • Mandatory energy efficiency targets • Align response to the electricity crisis with LTMS • Explore carbon pricing mechanisms • Diversify energy mix away from coal; promote cleaner coal • Feed-in tariffs • Targets for renewable, and nuclear energy • Explore CCS and coal-to-liquids (consider phase-out of coal plants without CCS) • Build domestic industries in clean sectors *Transport* • Targets to reduce transport emissions • Promote public transport, hybrids and electric vehicles
Observations on mitigation interventions	Many programs in the NAPCC underway for some time. It is not always clear how the plan will build or expand on these existing programs. Proposes to revisit many difficult / stalled policy and regulatory reform processes. Proposed programs to significantly expand solar power are new; energy efficiency mission implementation involves significant new programs.	Activities are categorized as "in implementation phase" or "in conception phase." Some activities in implementation date from the 1990s or earlier; others are newer. Activities "in conception" include both relatively untested ideas as well as others that are being actively explored. New deforestation goals are set, noting that international support is helping realize these efforts.	Much of the plan builds on ongoing programs. Emphasis on building R&D and technical capacity within the country. Identifies potential emission reductions of some interventions. Strong new emphasis on institutional reform, and coordination across agencies in implementing the plan.	Proposes new programs, including a cap-and-trade scheme for the energy sector. Strengthens some existing programs; states that others (e.g. several related to energy efficiency) are ongoing and are reflected in the baseline emissions scenario. Notes that not all proposed goals are funded; $7B have been assigned to goals targeting reductions of 93.5 MtCO$_2$e, leaving a $6.6B gap.	Plan explicitly identifies actions that would be new or scaled up as part of a response to climate change. Actions identified in the "start now" scenarios reflect ongoing priorities and programs; next the plan identifies measures to scale up these initiatives, and explores how market and other instruments might allow South Africa to take higher-cost steps.

	INDIA National Action Plan on Climate Change (NAPCC)	BRAZIL National Plan on Climate Change (PNMC)	CHINA National Climate Change Program	MEXICO Special Program on Climate Change (PECC)	SOUTH AFRICA Long Term Mitigation Scenarios (LTMS)
Examples of proposed adaptation interventions	*Agriculture* • Drought /thermal/ pest-resistant crop development • Improve communication and capacity of extension workers to support vulnerability-reducing activities • Weather modeling, risk insurance, credit; improve access to weather and agricultural information *Ecosystems / Biodiversity* • Monitor Himalayan glaciers and ecosystems • Improve land use and development planning • Improve coastal protection through infrastructure and forest/ mangrove restoration *Water* • Increase water use efficiency and equity • Mandate water harvesting and recycling • Wetlands conservation • Desalination technology development *General* • Support climate change research and modeling	*General* • Improve regional modeling of climate change impacts • Vulnerability mapping for coastal zones, biodiversity, water resources, electricity generation, oil and gas, desertification, urban areas • Reduce poverty and inequality • Prepare for health implications: improve knowledge base, increase technological capacity of health professionals, establish early warning systems • Identify most vulnerable groups and address socio-economic factors	*Agriculture* • Improve agricultural infrastructure • Promote use of high-yield, stress-resilient crops • Promote large-scale, water-saving irrigation *Ecosystems / Biodiversity* • Incorporate climate change into laws and regulations on forests and wetlands • Expand ecosystem monitoring systems • Expand forest area and develop bio-corridors • Refine fire forecasting, monitoring and suppression techniques • Prevent grassland desertification (increase by 24M hectares, restore 52M hectares) *Water* • Unify water management, planning, and allocation • Speed up water infrastructure development including North to South Water Diversion project • Slope and shore protection through engineering and biological measures	*Agriculture* • Reduce soil degradation • Modernize hydro-agricultural infrastructure • Databases on resilience of key crops *Ecosystems / Biodiversity* • Preserve, widen, and connect protected areas • Build ecosystem resilience • Avoid and control spread of invasive species, diseases, parasites *General* • Evaluate current national capacities and seek sectoral integration • Deepen understanding of impacts of climate change on agriculture, forestry, water, ecosystems, infrastructure, cities • Payments for environmental services • Implement early warning systems • Promote climate resilient building standards • Promote decentralized, small-scale, local energy supply systems	The LTMS do not address adaptation. South Africa is developing a National Climate Change Response Policy that touches on vulnerability and adaptation; the document was under discussion at press time.
	The plans for India, Brazil, China, and Mexico successfully provide an indication of national adaptation needs and priorities. They articulate the potential effects of climate impacts on livelihoods, economies, and natural systems, but stop short of providing concrete procedures and strategies for meeting adaptation needs. All four documents reflect preliminary adaptation planning efforts and require elaboration or supplementation (likely elsewhere, in sectoral or regional planning documents) to achieve greater specificity.				
Observations on adaptation interventions	The NAPCC proposes adaptation strategies directed at sectors, with a particular focus on increasing the resilience of agriculture, urban water infrastructure, and the Himalayan socio-ecological system. It emphasizes the need to avoid compromising national economic growth. The NAPCC also proposes strategies to address funding needs for adaptation. It fails to include specific adaptation practices and implementation tools for all sectors.	The PNMC establishes goals along two general themes - increasing institutional, managerial, and legislative capacity for adaptation and promoting direct action-steps for addressing impacts, risks, and particular vulnerabilities. The PNMC identifies specific sectors and locations in need of adaptation and proposes both short- and long-term strategies. It is fairly comprehensive but still falls short of identifying specific action-steps and implementation strategies.	The plan stresses the need for adaptation of human and natural systems without hindering economic development. There is also a great focus on national level policy/ legislative approaches to enhance China's overall adaptive capacity. The adaptation strategies proposed tend to be large in scope and scale - the vision of the plan is impressive, but the document lacks specific targets and action-steps for realizing these goals.	The PECC serves as a national guideline for promoting adaptation strategies; therefore it provides visions and goals for particular sectors but does not provide specific procedures for achieving these goals. The PECC addresses the importance of collaborating and harnessing existing institutional capacity through streamlining and integration.	

Senator Bernard Sanders
1. If we pass a strong global warming bill, in your view would that make it more likely that other countries would also act in order to keep pace in the race to develop clean technologies?

Dear Senator Sanders:

Absolutely. Passage of a strong global warming bill by the Senate is essential to locking in ambitious and verifiable action by other countries. Those who have worried that the United States might act alone need worry no more. The worry should be that without us, the rising global effort will falter. Almost every country which is a significant source of greenhouse gas emissions, developed and developing, has taken actions, or made significant proposals to reduce emissions and spur investment in clean technologies. However, they will commit internationally to verifiable obligations only if the U.S. takes on an ambitious commitment of its own.

The European Union and Japan have said that they will commit to reduction targets of 30% and 25% below 1990 levels by 2020 under the condition that other countries take ambitious action. My conversations with EU and Japanese leaders indicate that bold action on global warming by the U.S. would be essential to getting them to commit to these ambitious goals.

Developing countries such as China, India, Brazil, Mexico, and South Africa have also stepped forward with significant proposals and actions. For example, Mexico has pledged to halve its greenhouse gas emissions by 2050, employing a "cap-and-trade" policy like the one under consideration in the U.S. Congress. Brazil has pledged to reduce the deforestation responsible for most of its emissions by 70%. At the Major Economies Forum in July, China and India for the first time agreed at the international level to a declaration to take action to meaningfully reduce emissions below business as usual, peaking as soon as possible. Also, they recognized the scientific view that temperatures should not exceed 2 degrees Celsius above pre-industrial levels.

But locking in action by these countries into an international agreement depends on action on the pending legislation. Our negotiators will only be able to get other countries to sign on to a deal if we bring something meaningful to the table.

Senator George V. Voinovich
1. Mr. Lash - I think everyone here would agree that China is making significant investments in low-carbon technologies. Yet, for all the investments and progress they are making, they have routinely signaled their intention to forgo acceptance of international reduction targets. If we assume this issue is as important to the international community as some say it is, then shouldn't the U.S. be negotiating with other nations such as India and China for joint acceptance of GHG reduction targets? In others words, when we decided that the world needed to step back from the brink of nuclear war, the U.S. didn't just act in a vacuum, and start dissembling its nuclear weapons alone. Instead, we did the hard negotiating that was required - and together with the Russians, both our nations did what we had to do. In your testimony, you mentioned President Reagan's "Trust but verify" approach as an example for how the U.S/China negotiations

should proceed. That sounds great, but then again don't both sides have to come to an agreement to do something before any verification occurs? That being said, could you give us your opinion as to what the White House is doing to ensure China's participation in accepting binding climate targets? Why do you believe China is so hesitant to accept binding reductions?

Dear Senator Voinovich:

You are correct in saying that action by China is critical to reducing global emissions to safe levels. An international agreement and a bilateral relationship between the U.S. and China should ensure that all are taking ambitious and verifiable action.

In my view China is now ahead of the United States in taking action to limit emissions. As I noted in my testimony, China is already implementing an aggressive plan to improve energy intensity, boost production of renewable energy and reduce emissions. This plan has already reduced China's energy intensity by 20% over the last 5 years. President Hu Jintao in September committed to reduce Chinese carbon intensity by a "notable margin". I would suggest that this is a substantive enough offer to negotiate on.

The White House is working toward getting the Chinese to commit to meaningful action and absolute reductions in the longer term. President Obama will meet President Hu Jintao in November in Beijing to build upon the memorandum of understanding that was signed by Secretary Clinton in July. But the Administration has very little to negotiate with at present. Given the lack of U.S. engagement on climate to date, without legislation from Congress the U.S. is sitting at the negotiating table with no offer. By passing a strong cap-and-trade bill in the Senate we can give our negotiators the tool they need to obtain verifiable commitments from China and other countries.

This leads to the final consideration: when will Chinese action lead to an absolute peak and decline in emissions? At present Chinese reluctance to absolutely cap emissions is based partly on the country's relatively low level of development: the average Chinese still emits only a quarter as much as the average American. It is also based on the difficulty of implementing cap and trade in a country with relatively rudimentary data systems, erratic emissions growth and an undeveloped financial sector. At this stage it may be preferable to shape Chinese actions in forms that we (and they) are confident they can deliver.

Of course, ultimately we can only solve the climate problem by peaking and reducing emissions from countries like China. This year, China and India for the first time agreed at the international level to a declaration to take action to meaningfully reduce emissions below business as usual, peaking as soon as possible. Also, they recognized the scientific view that temperatures should not exceed 2 degrees Celsius above pre-industrial levels. This goal can only be achieved if Chinese emissions peak and decline in the near future. The Chinese, knowing this full well, endorsed this goal.

Senator BOXER. Thank you so much, Mr. Lash.

And our next witness is a minority witness, Iain Murray, Vice President for Strategy, Competitive Enterprise Institute.

Welcome.

STATEMENT OF IAIN MURRAY, VICE PRESIDENT FOR STRATEGY, COMPETITIVE ENTERPRISE INSTITUTE

Mr. MURRAY. Chairman Boxer, Ranking Member Inhofe, thank you for inviting me to testify today and for the opportunity to participate in such an outstanding panel.

Despite our deep disagreements over policy, I very much respect those who have preceded me and their commitment to their ideals. Only by maintaining a civil discourse where all views are heard can we ensure that our democracy reaches the right policy decisions. So I am glad to be able to present a different argument here today opposing passage of the Clean Energy Jobs and American Power Act.

Let me start by reading you three headlines from this week's edition of a weekly European environmental newsletter: "Britain set to miss 2020 carbon reduction target," "Revised E.U. energy efficiency plan faces delay," and "E.U. fails to agree to strategy for surplus carbon credits." On top of that is a further headline: "U.N. confirms upward trend in rich nations' emissions."

These headlines confirm something that is important to recognize. Even those nations that have taken on emissions reductions targets are not finding it easy even in a general financial climate that is conducive to emissions reduction. It comes as no wonder that the Hadley Centre in the United Kingdom is advising that the only way to reduce emissions as much as it wants is via a planned recession.

As you will see in my written testimony, my own United Kingdom, probably the best placed member of the E.U. to meet reductions from 1990 levels, owing to its change from coal- to gas-fired electricity in the early 1990s, will almost certainly not meet its own reduction targets.

Germany is beginning to realize that its 20-year experiment with feed-in tariffs and other subsidies to promote renewable energy has been a failure. Only a negligible 0.6 percent of its electricity production comes from solar power, despite $73 billion worth of subsidy this decade.

Spain has decided to cut its subsidies to renewable energy, having realized that it has created a green energy bubble. And those countries that have invested in green jobs are learning that most of them are transitory at best.

On top of that, the European Union's mission trading scheme has been an expensive failure. It has notably failed to cut emissions at all, but at extreme costs to E.U. taxpayers. My colleagues at the TaxPayers' Alliance in London are today releasing a study that finds the total cost of the ETS to European citizens amounts to as much as $171 billion, all for no reduction in emissions.

Indeed, as Matthew Sinclair of the TPA told me, current climate change policies, the renewable obligation, E.U. emissions trading scheme and the carbon emission reduction target make up around 14 percent of average British domestic electricity bills. On the industrial side, for an average medium size consumer, the renewables obligation, E.U. ETS and climate change levy, together contribute around 21 percent to industrial electricity bills. So much for the industrialized world.

I think, however, it is more important to recognize that meeting a global target of 50 percent reduction in emissions by 2050 will require significant reductions, even on a per capita basis, of emissions in the developing world. This is unconscionable.

Increased access to affordable energy represents the single best way to lift billions out of poverty. While unchecked global warming could do significant damage to developing countries, the effect of leaving people in poverty now and forever, to use Lord Stone's phrase, would be even worse. That is exactly why Indian Environment Minister Jairam Ramesh said just last week, "India will never accept internationally legally binding emission reduction targets or commitments as part of any agreement or deal or outcome."

The developing world needs to develop. If we cannot accept the comparative advantage that developing will give other countries, while we constrain our emissions, then keeping people mired in poverty is not a moral or acceptable solution.

Let me finish on a personal note about something else we can learn from the United Kingdom. My grandfather was a coal miner and union official in the industrial northeast of England. I grew up in coal mining country. I know first hand how wonderful the people of coal mining communities are and how tight knit their society is.

Unfortunately, decades of socialist government in the U.K. kept many mines alive when they could have been closed down organically with little disruption. And so the Conservative government had to close them down at once. This imposed significant hardship.

Just as surely, the bill before this house will close down the American coal industry in one fell swoop, but while it is still an economic benefit to the Nation. The devastation this will cause to coal mining communities will be difficult to observe, just as it was in England. These communities are located where they are because of the pit, as we called it. They have no way to attract new industries like Senator Kerry's fabled wind companies.

If you pass this bill, communities will die, and ordinary working class people's lives will be affected massively for the worse. Near where I grew up is a colliery town of Easington. It has a population of 5,000; 1,500 of them were employed in coal mining, and all lost their jobs at once when the mine closed.

Today, 30 years later, Easington is the fourth most economically deprived place in England and has the highest childhood obesity rate in the Nation. That is what you will do to coal mining communities if you pass this bill.

Senator Kerry said on Tuesday that the effects of climate change would be worse for Senator Inhofe's constituents than the economic costs. Tell that to the people of Easington. Every day is a bad climate day for them.

[The prepared statement of Mr. Murray follows:]

TESTIMONY OF IAIN MURRAY
VICE-PRESIDENT FOR STRATEGY, COMPETITIVE ENTERPRISE INSTITUTE
LEGISLATIVE HEARING ON S. 1733, CLEAN ENERGY JOBS AND AMERICAN POWER ACT

SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
THURSDAY, OCTOBER 29, 2009

Chairman Boxer, Ranking Member Inhofe, thank you for the opportunity to testify to this committee on the subject of S.1733, the Clean Energy Jobs and American Power Act.

My name is Iain Murray. I am Vice-President for Strategy at the Competitive Enterprise Institute, a free-economy, non-profit public policy group that has for twenty-five years opposed government interference in the workings of energy markets. I hold the Bachelor of Arts and Master of Arts degrees from the University of Oxford, the Master in Business Administration degree from the University of London and the Diploma of Imperial College of Science, Technology and Medicine. I have been examining public policy options relating to the environment for almost twenty years, having advised British ministers on the role of public transportation in London in the early nineties and having written on global warming since my immigration to the United States in 1998. Having worked within the British government and alongside European Union colleagues I bring personal experience of how other nations approach such policy problems.

The Competitive Enterprise Institute opposes passage of S.1733, in part precisely because it replicates policies that have been tried and failed by other nations and because it does not recognize that the path of emissions reduction is rightly unacceptable to developing nations, which will mean the United States will be placed at a serious economic disadvantage.

This testimony will first examine policies adopted by the EU and its member countries and will conclude that they are ineffective at best, detrimental to their citizens at worst, before examining the position of the developing world, concentrating on their own public statements and the reality of what emissions reduction means for them and their economies.

Policies Adopted by the European Union

It is important to recognize first that the USA has been outperforming most countries in terms of emissions reduction since 2000. According to the United Nations Framework Convention on Climate Change and the International Energy Agency[1], the United States has reduced its greenhouse gas emissions[2] by 3 percent. By comparison, the only major economy to reduce its emissions more was France, at 6 percent. The United Kingdom managed a similar performance to the US at -2.9 percent. Most other economies performed much worse, as is shown in the chart at Annex 1. This should be taken into account when comparing policies and performance.

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[1] UNFCCC, 2008 National Inventory Reports and Common Reporting Formats; IEA Online Energy Services.

[2] Includes emissions of carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons, and perfluorocarbons, as well as emissions and removals of carbon dioxide, methane, and nitrous oxide from land-use, land-use change and forestry activities.

The primary vehicle for European Union action to mitigate global warming is the European Emissions Trading Scheme (ETS). Indeed, the ETS is often spoken of as the model for any American cap-and-trade scheme for greenhouse gas emissions. However, the ETS has not been a success. A comprehensive review by British think-tank Open Europe in August 2007[3] concluded the following:

> The Emissions Trading Scheme (ETS) is supposed to be the EU's main policy tool for reducing emissions. But so far, it has been an embarrassing failure. In its first phase of operation [2005-2008], more permits to pollute have been printed than there is pollution. The price of carbon has collapsed to almost zero, creating no incentive to reduce pollution. Across the EU, emissions from installations covered by the ETS actually rose by 0.8%.

For those arguing that the second phase of the ETS (2009-2012) would be successful as the EU had "learned from the mistakes of Phase I," Open Europe sounded this warning:

> Open Europe argues however that in fact things have gone backwards for the ETS. In the second phase of the ETS member states will be able to "import" external Kyoto "credits" from developing countries in order to meet their targets for reductions. This might be unobjectionable if these 'imports' reflected real emissions cuts. But these credits have already been exposed as highly flawed, and often fraudulent. They don't always reflect absolute reductions in emissions, whilst many of these credits are generated from projects in developing countries

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[3] Open Europe, "Europe's Dirty Secret," August 2007, http://www.openeurope.org.uk/research/etsp2.pdf

that would have happened anyway. Such credits actually mean increased pollution.

Furthermore, many credits will be generated through a system which allows polluters to bag massive profits for very little effort. Unsurprisingly, the main beneficiaries will be large, highly capitalized firms with the capacity to attract the attention of speculative investment in potentially lucrative 'green' projects. Meanwhile, community level development will be sidelined, and sub- Saharan Africa will see just 4% of total investment from Kyoto credits.

The Open Europe report finds that it is highly likely that the majority of CO2 reductions in the next ETS phase will be simply 'bought in' through these imported permits. That means the ETS won't reduce emissions in Europe, and won't encourage companies to invest in low carbon technology – surely the main purpose of any serious climate change policy?

The report concludes that far from creating a credible basis for EU level action on climate change, the ETS has instead established a web of politically powerful vested interest groups, massive economic distortions and covert industrial subsidies. It will do practically nothing to fight climate change. It's good news for the traders and the large firms who will reap tens of billions of euros worth of profit through emissions trading. It's less good news for those who will suffer the consequences of global warming.

It should at this stage be noted that Phase I of the ETS has begun to be described as a "trial phase," as if it was only launched with the intention of testing it. This is not the case. My colleague Christopher Horner has examined the original directive and what was said about it at the time of the scheme's launch and concluded:

> The Directive establishing the ETS, 2003/87/EC, doesn't say anything about a trial and neither does the ETS FAQ page. Nor did the Commission make mention of a test when it formally approved ETS, nor in the previous announcement when it was finalized — when, in fact, they hailed ETS as the means for bringing Kyoto coming into effect[4].

Since Open Europe issued its report, the world has suffered a financial crisis with the result that emissions have reduced everywhere. This should not be counted as a success for the ETS. In fact, a new report published today by the British advocacy group The Taxpayers' Alliance[5] finds that the second phase has so far been an expensive failure even with the emissions reduction. It concludes:

> It is increasingly clear that the ETS just isn't working. The carbon price is so volatile that energy companies and environmentalists are calling for it to be fixed while ordinary families and manufacturing firms have to cope with an unpredictable addition to their energy bills. Windfall profits for energy companies

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[4] Christopher Horner, "Verdict: Failure," Planet Gore, May 19 2008. http://planetgore.nationalreview.com/post/?q=NGZmOGJlMjFiOTQzOWJkMTAzZmQ3MGUyMzI2NzA1MDc=

[5] Matthew Sinclair, "The Expensive Failure of the European Union Emissions Trading Scheme," October 2009. Published Thursday 29 October at http://www.taxpayersalliance.com

> are paid for by the poor and the elderly. We estimate that the total bill to consumers across Europe has been between €46 billion and €116 billion since the start of the scheme, with British families paying more than £117 in 2008 [per household]. As the permits are increasingly auctioned, that will just mean the scheme is another tax, and a regressive one, supporting excess public spending.

I asked the author, Matthew Sinclair, what the study means for the United States. He told me[6]:

> The European Union Emissions Trading Scheme has cost families across Europe tens of billions of dollars but it has been a goldmine for energy companies, which have made huge windfall profits. Despite that, it has failed to produce a stable carbon price, leaving consumers with an unpredictable addition to their bills. Manufacturers already struggling to compete with emerging economies like India and China cannot cope with such a substantial addition to their costs, and driving them abroad won't help cut emissions but will mean lost jobs. Americans shouldn't make the same mistake and risk their prosperity following the same flawed strategy that Europeans are paying such a steep price for.

It should be noted that criticism of the EU's approach does not only emanate from supporters of free enterprise, but also from the environmentalist movement itself. Green MEP Caroline Lucas said in *The Guardian* this week[7]:

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[6] Personal communication with author

> You report that EU environment ministers have proposed targets to cut global climate emissions from shipping and aviation in the run-up to Copenhagen (Report, 22 October), but you fail to mention that, because the targets would only be measured from 2005 levels – a reduction of 10% for aviation and 20% for shipping by 2020 – this would actually allow emissions to increase by up to one-third on 1990 levels. Here is a clear demonstration of the extent to which these industries still receive special treatment... What's more, it is likely that most of these reductions could be offset by carbon credits from projects whose true additionality and contribution to emission reductions remain in doubt.

In so saying, Ms. Lucas echoes precisely the criticisms of Open Europe that allowing international offsets significantly reduces the effectiveness of schemes in reducing actual emissions. Combined with the Taxpayers' Alliance's estimate of costs, it is clear that the EU's policy is one that represents real economic pain for no climate gain.

In short, the EU's policies on emissions reduction should not be a model for the United States to follow.

Policies Adopted by the United Kingdom

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[7] The Guardian, Letters to the Editor, October 26 2009, http://www.guardian.co.uk/environment/2009/oct/26/copenhagen-climate-summit-targets-gm

The most recent vehicle by which the United Kingdom seeks to reduce greenhouse gas emissions is the Climate Change Act 2008. The United Kingdom's Committee on Climate Change, created by the Act, announced in December 2008 that national greenhouse gas emissions should be reduced by at least 80% by 2050 and by 34% by 2022 (or 42% if an international agreement on climate change is reached)[8].

The UK's own governmental analysis of the benefits and costs of the Act bears investigation. Before the Act was debated in the House of Commons, the Impact Assessment suggested that the costs of the then bill would amount to some £205 billion, but that the maximum benefits ascribable to the bill totaled £110 billion. These costs and benefits related to an initial assessment that national greenhouse gas emissions would be reduced by 60% by 2050. On questioning by former Trade and Industry Secretary the Rt Hon Peter Lilley MP, the Minister of State for Energy and Climate Change told him that, "We are likely to find that the costs, which covered a very large range, were exaggerated."[9] However, a revised Impact Assessment issued after passage of the Act found that costs had risen to as much as £404 billion, resulting in a cost to each household of £20,000.

At the same time, benefits had risen from the previous estimate of £110 billion to a new estimate of over £1 trillion. Mr. Lilley noted, however, that the only change in methodology given in the new assessment justified only a doubling of the benefits. Such a massive increase in benefits from a version signed off on by Ministers only months earlier should arouse suspicion.

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[8] Committee on Climate Change 2008, "Building a low-carbon economy—the UK's contribution to tackling climate change," 1 December. http://www.theccc.org.uk/reports/

[9] Letter from Rt Hon Peter Lilley MP to Rt Hon Ed Milliband MP, Secretary of State for Energy and Climate Change, April 20, 2009. http://www.peterlilley.co.uk/article.aspx?id=10&ref=1421,

Moreover, independent analyses of the Climate Change Act suggest that the Committee's targets are wildly optimistic. For instance, Professor Roger Pielke, Jr., of the University of Colorado employed both a bottom up approach ("based on projections of future UK population, economic growth, and technology") and a top down approach ("deriving implied rates of decarbonization consistent with the targets and various rates of projected economic growth") to analyze the Act and found that[10]:

> Both approaches indicate that the UK economy would have to achieve annual rates of decarbonization in excess of 4 or 5%. To place these numbers in context, the UK would have to achieve the 2006 carbon efficiency of France by about 2015, a level of effort comparable to the building of about 30 new nuclear power plants, displacing an equivalent amount of fossil energy. The paper argues that the magnitude of the task implied by the UK Climate Change Act strongly suggests that it is on course to fail.

In passing the Act, the UK Parliament has therefore imposed significant costs on its citizens, by its own admission in the order of many thousands of dollars, in pursuit of a goal that it is very likely to fail to reach. The UK's approach is therefore not an appropriate model for the US to follow.

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[10] Pielke, Jr., R. A., 2009. The British Climate Change Act: A Critical Evaluation and Proposed Alternative Approach, Environmental Research Letters, Vol. 4, No. 2. June 18 2009.

It should here be noted that the Tyndall Center for Climate Change Research in the UK regards the Climate Change Act's targets as not ambitious enough. According to a story in the UK's Daily Telegraph[11], it has stated that the only way to keep temperatures below 2°C above pre-industrial levels is for the UK to reduce emissions by 70 percent by 2020. To do so would require a "planned recession." No further comment is necessary.

Germany, Spain and Renewable Technologies

It is often asserted that Germany and/or Spain are showing America the way when it comes to "green" energy technologies and that adopting similar policies would make America a world leader and give her a comparative advantage. However, closer examination reveals that these technologies are supported only by unsustainable levels of government investment and that the so-called "green jobs" supported by these subsidies are temporary at best.

Germany's "feed-in tariff," for instance, is often hailed as an example of how sustained government intervention on behalf of renewable technologies can result in new energy technologies gaining the maturity needed to compete against established technologies. The Renewable Energy Sources Act (EEG), originally introduced as the Electricity Feed-in Law of 1991, for example, has for almost two decades required utilities to purchase electricity generated from renewable technologies at 90 percent of the retail rate of electricity, significantly exceeding the cost of conventional electricity generation. The new law, passed in 2000, guarantees this rate for twenty years and goes so far as to provide more favorable terms for certain technologies, far above the production cost of 2 to 7 Euro-Cents (2.9-10.2 Cents US $) per kilowatt hour (kWh).

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[11] Louise Gray, "Planned Recession Could Avoid Catastrophic Climate Change," September 30 2009.

A new study from the Rheinisch-Westfälisches Institut (RWI) in Essen, Germany, analyzes the effects of these laws[12]. Their findings are worth quoting at length. To begin with, they conclude that the substantial subsidies represented by the feed-in tariffs have not established the industries despite two decades of operation:

> With a feed-in tariff of ¢59 per kWh in 2009, solar electricity generated from photovoltaics (PV) is guaranteed by far the largest financial support among all renewable energy technologies.
>
> Currently, the feed-in tariff for PV is more than eight times higher than the wholesale electricity price at the power exchange and more than four times the feed-in tariff paid for electricity produced by on-shore wind turbines.
>
> Even on-shore wind, widely regarded as a mature technology, requires feed-in tariffs that exceed the per-kWh cost of conventional electricity by up to 300% to remain competitive.

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[12] Manuel Frondel, Nolan Ritter & Colin Vance "Economic impacts from the promotion of renewable energies: The German experience," October 2009. http://www.rwi-essen.de/

> By 2008 this had led to Germany having the second-largest installed wind capacity in the world, behind the United States, and largest installed PV capacity in the world, ahead of Spain. This explains the claims that Germany's feed-in tariff is a great success.
>
> Installed capacity is not the same as production or contribution, however, and by 2008 the estimated share of wind power in Germany's electricity production was 6.3%, followed by biomass-based electricity generation (3.6%) and water power (3.1%). The amount of electricity produced through solar photovoltaics was a negligible 0.6% despite being the most subsidized renewable energy, with a net cost of about $12.4 billion for 2008.

Next, the study points out that the high cost of subsidizing these industries has been born by consumers:

> The total net cost of subsidizing electricity production by PV modules is estimated to reach US $73.2 billion for those modules installed between 2000 and 2010. While the promotion rules for wind power are more subtle than those for PV, we estimate that the wind power subsidies may total US $28.1 billion for wind converters installed between 2000 and 2010.
>
> Consumers ultimately bear the cost of renewable energy promotion. In 2008, the price mark-up due to the subsidization of green electricity was about ¢2.2,

> meaning the subsidy accounts for about 7.5% of average household electricity prices.

The study goes on to conclude that not only has the promotion of these technologies been anything but cost-effective in terms of emissions reduction, the net effect of the subsidies in climate terms has been zero:

> Given the net cost of ¢41.82/kWh for PV modules installed in 2008, and assuming that PV displaces conventional electricity generated from a mixture of gas and hard coal, abatement costs are as high as $1,050 per ton.
>
> Using the same assumptions and a net cost for wind of ¢3.10/kWh, the abatement cost is approximately $80. While cheaper than PV, this cost is still nearly double the ceiling of the cost of a per-ton permit under Europe's cap-and-trade scheme. Renewable energies are thus among the most expensive GHG reduction measures.
>
> There are much cheaper ways to reduce carbon dioxide emissions than subsidizing renewable energies. CO2 abatement costs of PV are estimated to be as high as $1,050 per ton, while those of wind power are estimated at $80 per ton. By contrast, the current price of emissions certificates on the European emissions trading scheme is only 13.4 (Euro) per ton. Hence, the cost from emission reductions as determined by the market is about 53 times cheaper than employing PV and 4 times cheaper than using wind power.

> Moreover, the prevailing coexistence of the EEG and emissions trading under the European Trading Scheme (ETS) means that the increased use of renewable energy technologies generally attains no additional emission reductions beyond those achieved by ETS alone. In fact, since the establishment of the ETS in 2005, the EEG's net climate effect has been equal to zero.

The study then addresses the argument that the tariffs have created jobs and finds this argument without merit:

> While employment projections in the renewable sector convey seemingly impressive prospects for gross job growth, they typically obscure the broader implications for economic welfare by omitting any accounting of off-setting impacts. These impacts include, but are not limited to, job losses from crowding out of cheaper forms of conventional energy generation, indirect impacts on upstream industries, additional job losses from the drain on economic activity precipitated by higher electricity prices, private consumers' overall loss of purchasing power due to higher electricity prices, and diverting funds from other, possibly more beneficial investment.
>
> Proponents of renewable energies often regard the requirement for more workers to produce a given amount of energy as a benefit, failing to recognize that this lowers the output potential of the economy and is hence counterproductive to net

> job creation. Significant research shows that initial employment benefits from renewable policies soon turn negative as additional costs are incurred. Trade-and other assumptions in those studies claiming positive employment turn out to be unsupportable.
>
> In the end, Germany's PV promotion has become a subsidization regime that, on a per-worker basis, has reached a level that far exceeds average wages, with per-worker subsidies as high as $240,000.
>
> It is most likely that whatever jobs are created by renewable energy promotion would vanish as soon as government support is terminated, leaving only Germany's export sector to benefit from the possible continuation of renewables support in other countries such as the US.

(We shall see the truth of this last statement validated when we discuss Spain below.) The study finally examines the arguments that the policies have made Germany more energy secure and a leader in energy innovation. Neither of these can be supported:

> Due to their backup energy requirements, it turns out that any increased energy security possibly afforded by installing large PV and wind capacity is undermined by reliance on fuel sources — principally gas — that must be imported to meet domestic demand. That much of this gas is imported from unreliable suppliers calls energy security claims further into question.

> Claims about technological innovation benefits of Germany's first-actor status are unsupportable. In fact, the regime appears to be counterproductive in that respect, stifling innovation by encouraging producers to lock into existing technologies.

In summary, Germany's experience with feed-in tariffs and extensive, decades long support of renewable energy technologies have provided none of the benefits generally claimed for such policies. As such, it does not provide an appropriate model for US policy.

A similar story applies in regards to Spain, which also decided to use government intervention in the market to make itself a "world leader" in renewable energy technology. A study from a team from King Juan Carlos University in Madrid led by Dr. Gabriel Calzada[13] found that the opportunity costs of public investment in renewable energy were very high, resulting not just in significant numbers of jobs destroyed or their creation averted, but in unsustainable bubbles in the renewable sector:

> The most paradigmatic bubble case can be found in the photovoltaic industry. Even with subsidy schemes leaving the mean sale price of electricity generated from solar photovoltaic power 7 times higher than the mean price of the pool, solar failed even to reach 1% of Spain's total electricity production in 2008…

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[13] "Study of the effects on employment of public aid to renewable energy sources," March 27, 2009. http://www.juandemariana.org/pdf/090327-employment-public-aid-renewable.pdf

> [T]he only way for the "renewables" sector - which was never feasible by itself on the basis of consumer demand - to be "countercyclical" in crisis periods is also via government subsidies. These schemes create a bubble, which is boosted as soon as investors find in "renewables" one of the few profitable sectors while when fleeing other investments. Yet it is axiomatic, as we are seeing now, that when crisis arises, the Government cannot afford this growing subsidy cost either, and finally must penalize the artificial renewable industries which then face collapse.

Having recognized the unsustainability of the subsidies, the Spanish government decided to reduce the size of subsidies to renewable energy. Analyses suggested that the solar industry was on course to lose 40,000 jobs this year. However, it may be that the US taxpayer is now subsidizing employment in Spanish industry. Under a new program that provides grants to renewable energy providers who opt for cash payments rather than the 30 percent investment tax credit, the Treasury Department has announced grants totaling $295 million to Spanish renewable giant Iberdola, out of a total of $502 million awarded[14].

Other important findings from the Spanish study included the confirmation of findings relating to the ETS, British and German policies, that they impose significant burdens on taxpayers:

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[14] "Treasury grants' big winners: wind companies," Greentech.com, Sept 1 2009. http://www.greentechmedia.com/articles/read/treasury-grants-big-winners-the-wind-people/

> Renewables consume enormous taxpayer resources. In Spain, the average annuity payable to renewables is equivalent to 4.35% of all VAT collected, 3.45% of the household income tax, or 5.6% of the corporate income tax for 2007.

If the US wishes to avoid all these problems, it should not follow the models presented by Europe.

What Emissions Reductions Will Mean for the Developing World

In its analysis of the Chairman's mark of the legislation before you, the Environmental Protection Agency comments as follows:

> Given the CO2e concentrations for the various scenarios, we can also calculate the observed change in global mean temperature (from pre-industrial time) in 2100 under different climate sensitivities. Assuming the G8 goals (reducing global emissions to 50% below 2005 by 2050) are met, warming in 2100 would be limited to no more than 2 degree Celsius (3.6 degrees Fahrenheit) above pre-industrial levels under a climate sensitivity of 3.0 or lower.

It is important to realize what exactly is required to meet the goal of emissions 50 percent below 2005 levels and what that means for the developing world.

The plain fact is that, as can be seen in the chart below, emissions increases over the next 40 years are predicted to come overwhelmingly from the developing world, such that emissions from Annex II Kyoto nations will be almost twice those of Annex I nations by 2050 (see graph at Annex 2).

What this means is that to hit a target of 50% global emissions reduction by 2050, there will need to be significant reductions in emissions from business-as-usual by the developing world nations. The size of the reduction demanded of developing nations is very much dependent on what level of emissions reductions the developed world manages (see chart at Annex 3). If, for instance, the developed world is able to completely eliminate its emissions by 2050, then developing world emissions will need to reduce by about 62 percent from business-as-usual. If, however, the developed world is only able to halve its emissions, developing world emissions will need to drop by 85 percent from business-as-usual.

This in itself would prove difficult for countries that need access to the most affordable energy possible in order to grow, prosper and raise their living standards. However, it does not tell the whole story. The developing world lags considerably behind the developed world in terms of per capita emissions, and developing world populations are likely to continue to grow. This means that, in order to achieve 50 percent reductions in global emissions, per capita emissions in the developing world countries will have to reduce from their current, energy-starved levels *even if the developed world completely eliminates its emissions* (see chart at Annex 4). If the developed world is only able to halve its per capita emissions from 2005 levels, then to achieve a global 50 percent reduction, developing world per capita emissions would have to reduce by 85 percent. Even if the developed world were able to reduce its emissions by 80 percent, per capita emissions in the developing world would have to reduce by 71 percent and developing world per capita emissions would still need to be less than per capita emissions in the developed world. This is likely to prove unacceptable to developing world nations, and rightly so.

The plain fact is that, throughout the industrial age, emissions and growth have been tightly correlated. This is because growth occurs fastest when the energy on which it is based is most affordable. That is why the prophesied Atomic Age of nuclear-powered energy never appeared. Even before large-scale anti-nuclear protests concerned at the safety aspects of nuclear power began in the Western world, the number of new nuclear plant permits applied for was declining because the large capital cost of building a nuclear plant made it uncompetitive with coal- and gas-fired power. The extra regulations demanded by the anti-nuclear movement simply increased those costs. Only in countries where governments decided to absorb those up-front costs, such as France in decades past, did nuclear establish itself as a major source of power. Indeed, we can learn much from the optimistic forecasts of the early nuclear age. As Canadian economist Vaclav Smil has noted, "the US Atomic Energy Commission's 1974 forecast had 1.2 TW of nuclear capacity installed in the US in the year 2000: the actual 2000 total was 81.5 GW, less than 7% of the original forecast, an order of magnitude forecasting miss."

That is why unconventional technologies will not be the energy source of choice for developing nations. They require as much "bang-per-buck" as possible in order to lift their people out of poverty and are unlikely to be impressed by arguments that they should choose more expensive forms of energy, a decision which will necessarily involve large opportunity costs in terms of poverty relief. As we have seen in the case of Germany, renewable energy remains uncompetitive after many years of government subsidy. Therefore, even if the developed world were to commit to subsidize the developing world's use of such technologies, such a commitment would necessarily need to be open-ended, and would represent a significant extra tax on developed world economies, one that would surely grow as developing world populations grew. This is likely to prove unacceptable to the populations of developed world nations.

It seems likely, therefore, that the only form of developed world subsidy of the developing world's energy infrastructure that might prove mutually acceptable is limited-time subsidy of the construction of large numbers of nuclear power plants, perhaps on the basis of loans to be paid back from the savings resulting from much more affordable power per kilowatt hour following construction. This, however, is likely to prove unacceptable to the mainstream environmental establishment.

There is also an argument that the developing world is rapidly moving ahead of the developed world, specifically the United States, in terms of renewable energy production. This, however, is both less and more than it seems. The reason why China, for instance, is able to produce so many wind turbines is that its energy costs are currently very low. Making turbines is an energy-intensive business and China's coal-powered power plants are able to supply the energy at much lower cost than in the west. That is why, for instance, the British wind-turbine manufacturer Vestas has recently had to lay off 625 workers[15], in yet another striking example of the impermanence of so-called "green jobs."

The Positions of Developing World Nations in their Own Words

Bearing these points in mind, it is therefore instructive to look at what the leading countries in the developing world are saying on the subject of emissions reduction. In this respect, the position taken by the G77 group of developing nations at the meeting of the UNFCCC in Bangkok, Thailand, in early October is especially illuminating. Senior G77 representatives, including those from China and South Africa, walked out of the meeting in protest at developed world attempts to secure emissions reductions from developing world countries[16]. South African spokesman Alf Wills said:

> The G77 is extremely concerned with the notion that there is a clear intention being shown that developed countries, who are party to the Kyoto Protocol, of not agreeing to new targets for the second commitment period of the Kyoto Protocol.

He further told Reuters news agency:

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[15] BBC News, "Sit in workers ignore court order," August4 2009. http://news.bbc.co.uk/2/low/uk_news/england/hampshire/8183323.stm

[16] Reuters, "Senior G77 Members Protest Steps to Change Kyoto Pact," October 7 2009

> The G77 rejects the notion and proposal to collapse or 'cut and paste the good parts of the Kyoto Protocol' (one wonders what the bad parts are) into a new single legal instrument under the Convention.

G77 members are concerned that developed nations, including the EU, are worried that, (in the words of an EU diplomat quoted by Reuters,) "If all we get is a second commitment period to the Kyoto Protocol ... [and] ... there's no balancing legally binding agreement from developing countries ... then the risk will be that those countries inside the protocol with a commitment [to reduce emissions] will either weaken their commitment, not take a commitment or not ratify." In other words, developed nations are concerned that developing nations must commit to reduce their emissions or the developed nations will be harmed economically. This position is unacceptable to the G77.

At the same time, Sudanese ambassador Lumumba Di-Aping told African news agency Panapress[17],

> On proposals to have developing countries commit to emission targets, Lumumba said developed countries needed to accept that economic and sustainable development were important and needed to accept the right of developing countries to pursue rapid development.

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[17] Panapress, "G77, China accuse rich nations of discarding Kyoto protocol," October 8 2009. http://unfccc.int/files/meetings/intersessional/bangkok_09/press/application/pdf/panapress_g77_china_accuse_rich_nations_of_discarding_kyoto_protocol.pdf

(It should be noted that a consistent theme in these complaints is that the actions are those of rich countries together, often specifically the European Union. This should be remembered when blame is inevitably cast on the United States, and specifically this noble house, should no meaningful agreement be forthcoming in Copenhagen.)

It is also helpful to review the recent statements of Indian Environment Minister Jairam Ramesh, and the reaction within India to these statements. Last week, Mr. Ramesh appeared to distance himself from the G77 stance and suggested that India should "listen more and talk less" at climate talks. The internal reaction was furious and Mr. Ramesh has been forced, as they say, to clarify his position. In the statement issued in reaction to a report in the Times of India on October 19, Mr. Ramesh said[18]:

> Yesterday, a leading newspaper had carried a news item on a discussion note that I wrote on climate change. The news item has quoted only partially and selectively from this note, and significantly added its own editorial interpretations, thereby completely distorting and twisting its meaning.
>
> Let me reiterate India's non-negotiables in the ongoing international climate change negotiations.
>
> While India is prepared to discuss and make public periodically the implementation of its National Action Plan on Climate Change, India will never

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[18] The Thaindian, "India's interests alone will direct climate policy: Jairam Ramesh," October 20 2009. http://www.thaindian.com/newsportal/enviornment/indias-interests-alone-will-dictate-climate-policy-jairam-ramesh_100263174.html#ixzz0V58bxTYo

> accept internationally legally binding emission reduction targets or commitments as part of any agreement or deal or outcome.

There could be no clearer statement of India's continued refusal to accept limits on its growth and its commitment to lift its people out of poverty.

As for China, it was reported last month that Chinese premier Hu Jintao had promised to make "notable cuts" in emissions, when what Hu actually said was,

> We will endeavor to cut carbon dioxide emissions per unit of GDP by a notable margin by 2020 from the 2005 level.

In other words, Hu has promised to reduce China's *emissions intensity*, not its total emissions. As the China Economic Review summarized, "Even if China meets this target, its overall emissions may continue to rise indefinitely.[19]" In fact, this proposal mirrors exactly President George W. Bush's approach to emissions.

China's national plan on climate change stresses that "sustainable development and poverty eradication" remain the country's first priorities. Explaining this when the plan was launched in 2007, Ma Kai, chairman of China's National Development and Reform Commission, said,

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[19] China Economic Review, "Hu promises 'notable' cutback in China's emissions," September 23 2009

> China is a developing country. Although we do not have the obligation to cut emissions, it does not mean we do not want to shoulder our share of responsibilities... The international community should respect the developing countries' right to develop.[20]

This remains China's position today. When China and India recently signed an agreement on their approach to global warming, Jairam Ramesh noted that the two countries stand united in their approach to Copenhagen. Neither country will accept binding emissions reduction targets.

The Likelihood of a Meaningful Agreement at Copenhagen

Earlier this year, Rajendra Pachauri, head of the UN Intergovernmental Panel on Climate Change said, " It is crucial that in Copenhagen in December 2009 governments from across the world reach agreement on tackling the challenge of climate change on a collective basis." Such a collective agreement is looking very distant at the moment. The developed nations, led by the European Union, appear to be demanding that developing nations take on binding emissions reductions. The developing nations, led by China and India, not only refuse to take on such binding promises, but are also demanding large amounts of subsidy and technology transfer from the developed world to jump-start their renewable energy industries.

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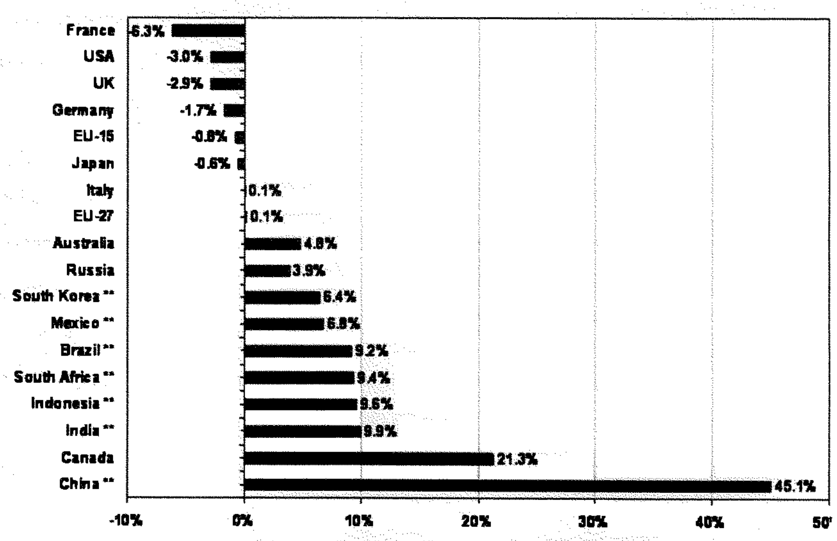
[20] BBC News, "China unveil climate change plan," June 4 2007.

It is therefore unlikely that any agreement will be reached that is meaningful in terms of emissions reduction. There will surely be some agreement reached, that will of course be hailed as an historic agreement, probably noting that it was reached despite America's stance, but in the cold light of day it will fall some way short of binding parties to make the sort of hard choices that are needed if we are to stabilize CO2 concentrations in the atmosphere at anything like the level of 450 ppm, never mind the new demands for 350 ppm.

What this means is that the strategy of emissions reduction for tackling global warming risks is increasingly becoming a dead end. The circle of emissions reduction cannot be squared with the requirements of developing nations to reduce poverty under current technology. America should recognize this and develop a truly innovative approach to combating global warming that concentrates on adaptation measures, building resiliency among developing nations and encouraging innovation in energy technology (rather than relying on old technologies that have not proved up to the challenge). As the bill before this house does not do this, instead modeling itself on the failed policies of Europe, the Competitive Enterprise Institute opposes passage of S.1733.

Annex 1: Greenhouse Gas Reductions in Selected Countries, 200-2006

Changes in Net GHG Emissions[1] 2000-2006 from 17 Major Economies

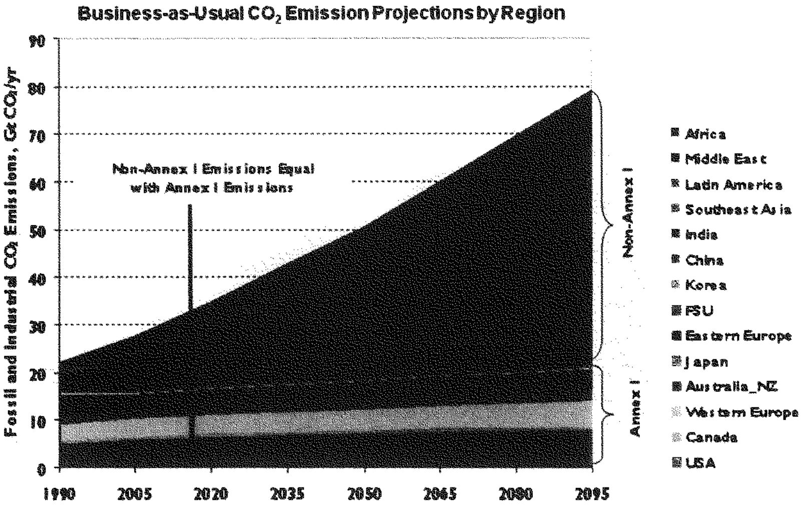


[1] Includes emissions of carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons, and perfluorocarbons, as well as emission removals of carbon dioxide, methane, and nitrous oxide from land-use, land-use change and forestry activities.

** No UNFCCC data available for time period; 2001 through 2005 IEA data used.

Sources: UNFCCC, 2008 National Inventory Reports and Common Reporting Formats and IEA Online Energy Services.

Annex 2:

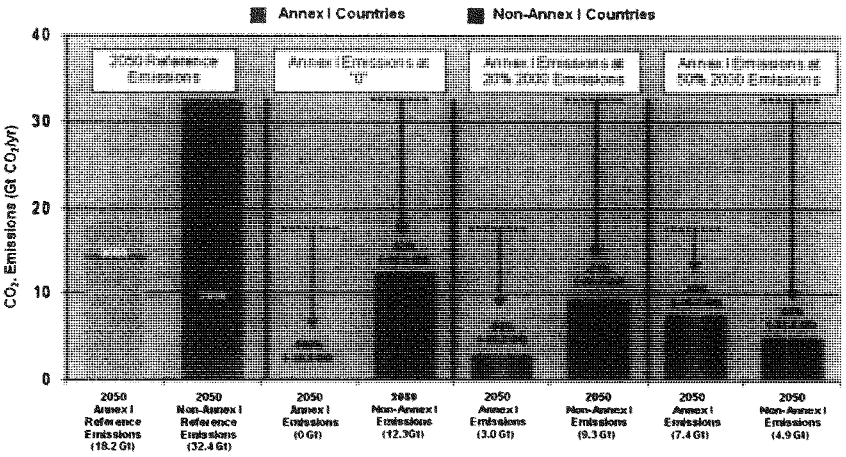

Business-as-Usual CO_2 Emission Projections by Region

Data derived from *Global Energy Technology Strategy, Addressing Climate Change: Phase 2 Findings from an International Public-Private Sponsored Research Program*, Battelle Memorial Institute, 2007.

Annex 3:

To Achieve a 50% Reduction in Global CO_2 Emissions by 2050, Need Significant Reductions from Developing Countries

Annual Gigaton CO_2 and Percent Reductions from 2050 Reference[3]



[1] Includes fossil and other industrial CO_2

[2] 50% of 2000 global GHG emissions equals 12.3 Gt

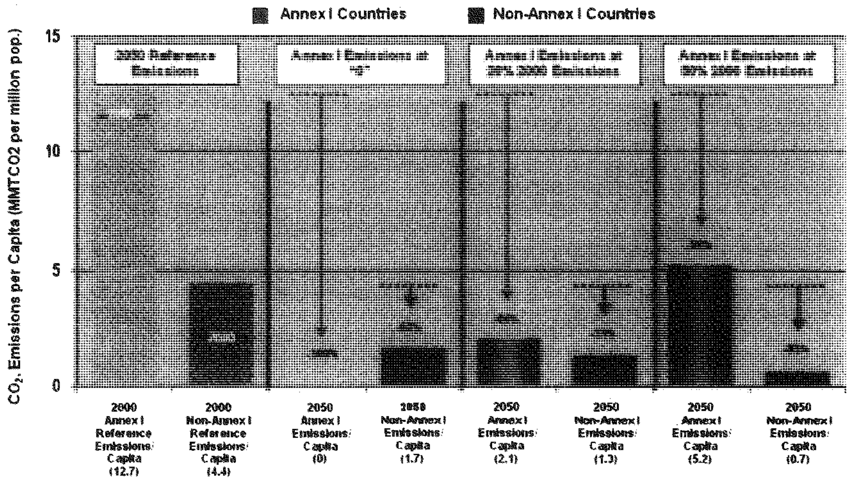
[3] Equals reduction from 2050 reference for that group (i.e., Annex I or Non-Annex I)

Source: Climate Change Science Program 2007. *Scenarios of Greenhouse Gas Emissions and Atmospheric Concentrations* (MINICAM Model results).

Annex 4

To Achieve a 50% Reduction in Global CO_2 Emissions by 2050, Per Capita Emissions from Developing Countries Must Go Down

Percent Reductions from 2050 Reference[3]



[1] Measured as $MMTCO_2$ per million people, excluding LULUCF.

[2] 50% of 2000 global CO_2 emissions equals 12.3 Gt

[3] Equals reduction from 2050 reference for that group (*i.e.*, Annex I or Non-Annex I).

Source: Climate Change Science Program. 2007. *Scenarios of Greenhouse Gas Emissions and Atmospheric Concentrations* (MINICAM Model results).

Senator BOXER. Thank you, sir.

You know, I don't know much about these towns in England, although I know you do. But I do know about my own State. So I want to put in the record the Pew Charitable Trust information.

[The referenced information follows:]

THE PEW CHARITABLE TRUSTS

The Clean Energy Economy
California

California has the largest clean energy economy of the 50 states. Jobs in this sector grew at a faster rate than total jobs in the Golden State between 1998 and 2007. California's clean energy economy has been driven by significant investment, attracting more than $6.5 billion in venture capital in the past three years. It also has been driven by public policies, from financial incentives for clean energy development and energy efficiency to renewable portfolio and energy efficiency standards. California's Green Building Action Plan—a goal for public buildings to be 20 percent more energy efficient by 2015—could save the state $100 million annually.[1]

BY THE NUMBERS, THE CLEAN ENERGY ECONOMY:

Jobs (2007): **125,390**
Businesses (2007): **10,209**
Venture Capital Funds (2006-2008)*: **$6,580,426,908**
Patents (1999-2008): **1,401**

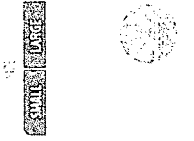
EXAMPLES OF COMPANIES:**

Bridgelux, *Sunnyvale* (Energy Efficiency): designs and manufactures LED lighting

Zpower, *Camarillo* (Clean Energy): designs and manufactures silver zinc batteries for next generation cell phones and computers (formerly known as Zinc Matrix Power)

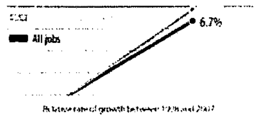
STATUS OF CLEAN ENERGY ECONOMY

AVERAGE ANNUAL RATE OF



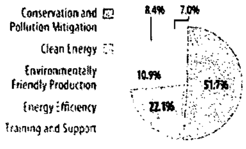
Average yearly rate of growth between 1998 and 2007

10-YEAR GROWTH



Relative rate of growth between 1998 and 2007

JOB CATEGORIES***



Share of jobs in the clean energy economy by category

MORE ABOUT THESE FACTSHEETS

Download the full report by visiting www.pewtrusts.org/cleanenergyeconomy

NOTES: *Values reported in 2008 dollars. **Information current as of May 8, 2009. This report is intended for educational and informational purposes. References to specific products, services, companies and policy makers have been included solely to advance these purposes and do not constitute an endorsement, sponsorship or recommendation by The Pew Charitable Trusts. ***These numbers may not add up to 100 percent due to rounding. ****Financial incentives include residential, commercial and industrial loan financing, rebate programs and tax incentives.

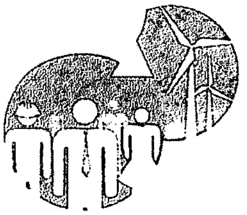
SOURCES: Jobs and establishment data from The Pew Charitable Trusts, 2009; based on the National Establishment Time Series Database; analysis by Pew Center on the States and Collaborative Economics.
[1] State of California: Office of the Governor press release, "Executive Order S-20-04," December 14, 2004, http://gov.ca.gov/executive-order/3360/ (accessed May 13, 2009).

CLEAN ENERGY POLICIES

Financial Incentives****	●
Renewable Portfolio Standards	●
Energy Efficiency Resource Standards	●
Regional Cap and Trade Program	●

The Pew Charitable Trusts applies the power of knowledge to solve today's most challenging problems.
901 E Street NW | 10th Floor | Washington, DC 20004 | www.pewtrusts.org/cleanenergyeconomy

the CleanEnergy Economy



Repowering Jobs, Businesses and Investments Across America

THE
PEW
CHARITABLE TRUSTS

Executive Summary

America's clean energy economy is dawning as a critical component of the nation's future.

Research by The Pew Charitable Trusts shows that despite a lack of sustained policy attention and investment, the emerging clean energy economy has grown considerably—extending to all 50 states, engaging a wide variety of workers and generating new industries. Between 1998 and 2007, its jobs grew at a faster rate than overall jobs. Like all other sectors, the clean energy economy has been hit by the recession, but investments in clean technology have fared far better in the past year than venture capital overall. Looking forward, the clean energy economy has tremendous potential for growth, as investments continue to flow from both the government and private sector and federal and state policy makers increasingly push for reforms that will both spur economic renewal and sustain the environment.

By 2007, more than 68,200 businesses across all 50 states and the District of Columbia accounted for about 770,000 jobs that achieve the double bottom line of economic growth and environmental sustainability (Exhibit 1).

In today's tough financial climate, when millions of jobs have been lost, those numbers may sound modest. Three quarters of a million jobs represent half a percent of all jobs in the United States today. But Pew's research shows that between 1998 and 2007, clean energy economy jobs—a mix of white- and blue-collar positions, from scientists and engineers to electricians, machinists and teachers—grew by 9.1 percent, while total jobs grew by only 3.7 percent. And although we expect job growth in the clean energy economy to have declined in 2008, experts predict the drop in this sector will be less severe than the drop in U.S. jobs overall.

Pew's research indicates a strong start for a new economy still very much in its infancy. To put our clean energy economy numbers in perspective, consider the following. Biotechnology, which has developed applications for agriculture, consumer products, the environment and health care and has been the focus of significant public policy and government and private investment, employed fewer than 200,000 workers, or about a tenth of a percent of total U.S. jobs in 2007, according to a 2008 Ernst & Young report. And the well-established traditional energy sector—including utilities, coal mining and oil and gas extraction, industries that have received significant government investment—comprised about 1.27 million workers in 2007, or about 1 percent of total employment.

Growing attention and financial support from both the private and public sectors indicate that the clean energy economy is poised to expand significantly. Signaling interest in new market opportunities, venture capital investment in clean technology crossed the $1 billion threshold in 2005 and continued to grow substantially, totaling about $12.6 billion during the past three years. Although they have dropped significantly in recent months because of the recession, investments in clean technology are actually faring better than other industries: They were down 48 percent in the first three months of 2009 compared with a year earlier, while total venture capital across all sectors was down 61 percent for the same period. "It's important not to miss the forest for the trees," Nicholas Parker, executive chairman of the Cleantech Group, said in January 2009. "In 2008, there was a quantum leap in talent, resources and institutional appetite for clean technologies. Now, more than ever, clean technologies represent the biggest opportunities for job and wealth creation."

Between 2006 and 2008, 40 states and the District of Columbia attracted venture capital investments in technologies and industries aimed at economic growth and environmental sustainability. And all states will receive a major infusion of federal funds through the recently enacted American Recovery and Reinvestment Act (ARRA), which allocates nearly $85 billion in direct spending and tax incentives for energy- and transportation-related programs.

Every State Has a Piece of the Clean Energy Economy

With traditional manufacturing jobs declining during the past decade, states have been working aggressively to develop new industries and create jobs that will endure—and remain within U.S. borders. They also have been working to address the public's concerns about high energy prices, national security and our dependence on foreign oil, and global warming—all with an understanding that America is on its way to being a carbon-constrained country. "While our economic engine has for years been powered by relatively inexpensive energy, there is evidence that this era is coming to a close," a National Governors Association report noted in 2007. "Meanwhile, we are increasingly aware of the serious impacts of global climate change—and how America's consumption of fossil fuels is contributing to a warming Earth."

Pew's analysis shows that every state has a piece of America's clean energy economy. Texas, for instance, generates more electricity from wind than any other state, had more than 55,000 clean energy economy jobs in 2007, and attracted more than $716 million in venture capital funds for clean technology between 2006 and 2008. Tennessee has succeeded in cultivating jobs in recycling, waste treatment and water management, among other conservation industries; jobs in Tennessee's clean energy economy grew by more than 18 percent between 1998 and 2007, compared with 2.5 percent growth in all jobs in the state. Colorado has raised the amount of power electricity providers must supply from renewable energy sources to stimulate job growth in solar and wind power and other forms of clean energy generation. Ohio ranked among the top five states with the most jobs in clean energy, energy efficiency and environmentally friendly production in 2007. Idaho, Kansas, Mississippi and South Dakota are among more than a dozen states where the number of jobs in the clean energy economy in 2007 was modest, but the average annual growth rate of those jobs was among the highest in the country. All told, in 38 states and the District of Columbia, job growth in the clean energy economy outperformed total jobs growth between 1998 and 2007. In a number of states, job gains in the clean energy economy have helped lessen total job losses.

Defining the Clean Energy Economy

Pew partnered with Collaborative Economics, Inc., a public policy research firm based in California, on the research. While organizations on both sides of the political spectrum have weighed in with forecasts and economic modeling to estimate the size of the clean energy economy, Pew's analysis is the first of its kind to count actual jobs, businesses and investments for each of the 50 states and the District of Columbia. Our numbers are conservative and may be lower than some other reports for three reasons: First, we developed a stringent definition of the clean energy economy; second, we used a new, labor-intensive methodology that counted only companies that we could verify online as being actively engaged in the clean energy economy; and third, we counted businesses and jobs supplying products and services generated by the clean energy economy, not the companies using these products and services to make themselves "greener" (i.e., we counted only companies and jobs on the supply side, not the demand side, of the clean energy economy).

Policy makers, business leaders and the public need credible, reliable data to ground their policy deliberations and choices, and to understand where emerging economic opportunities lie. They also need a clear, concrete and common definition of what constitutes the clean energy economy so they can track jobs and businesses and gauge the effectiveness of public policy choices and investments.

Based on significant research and input from experts in the field, including the advisory panel that helped guide this study, Pew developed the following definition:

A clean energy economy generates jobs, businesses and investments while expanding clean energy production, increasing energy efficiency, reducing greenhouse gas emissions, waste and pollution, and conserving water and other natural resources.

The clean energy economy cuts across five categories: (1) Clean Energy; (2) Energy Efficiency; (3) Environmentally Friendly Production; (4) Conservation and Pollution Mitigation; and (5) Training and Support.

While specific jobs and businesses will change in the coming decades, the five categories of the clean energy economy will not—providing a clear, practical and consistent framework for federal, state and local policy makers and the private sector to track investments, job and business creation, and growth over time.

Jobs of Today, and Jobs of Tomorrow

Pew's framework takes into account that technology, scientific research, market forces and public policy will continue to drive innovation and competition, so the largest segments of today's clean energy economy may not be its driving forces tomorrow.

Our data show that 65 percent of today's clean energy economy jobs are in the category of Conservation and Pollution Mitigation—a sector that reflects the growing recognition among the public, policy makers and business leaders of the need to recycle waste, conserve water and mitigate emissions of greenhouse gases and other pollutants. But three other categories—Clean Energy, Energy Efficiency and Environmentally Friendly Production—are growing at a far faster clip. And about 80 percent of venture capital investments in 2008 were in the sectors of Clean Energy and Energy Efficiency: businesses and jobs working to develop clean, renewable energy sources such as wind and solar and products and services that reduce our overall energy consumption—all of which will help meet the demands of a carbon-constrained economy.

The flow of venture capital indicates which sectors are most attractive to investors and have the greatest growth potential. The number of jobs and businesses in Clean Energy and Energy Efficiency will grow over time—and as the country increases the amount of power it draws from renewable sources, we will generate less waste, reduce our reliance on foreign oil and produce fewer carbon emissions that cause global warming. That does not mean that jobs in the Conservation and Pollution Mitigation category will disappear. As other countries seek to follow America's lead, they increasingly will need help managing their finite natural resources and addressing the adverse effects of their use of fossil-fuel energy sources—creating a new market for our products, technology and know-how.

Public Policy's Role in Driving the Clean Energy Economy

Public policy is another important indicator of the future of the clean energy economy.

Policies intended to advance the clean energy economy—from comprehensive energy plans, renewable energy standards and energy efficiency measures to the development of alternative fuels, job retraining and waste reduction efforts—have been adopted or are being actively considered by both the federal government and states. It is too early to tell to what degree these efforts will succeed in stimulating U.S. job growth, strengthening America's competitiveness, curbing pollution and conserving resources. But Pew's analysis indicates such policies have great potential because they create significant incentives for both the private and public sectors to develop new technologies, infrastructure and processes for clean energy, efficiency and conservation. Now that we have baseline data in hand, Pew will conduct follow-up research to assess which approaches are particularly effective in generating jobs, businesses and investments in the clean energy economy.

State policies. Governors and legislators across the country are seeking to get to the double bottom line of economic growth and environmental sustainability by adopting policies to advance the clean energy economy.

- *Financial incentives.* Forty-six states offer some form of tax incentive to encourage corporations and residents to use renewable energy or adopt energy efficiency systems and equipment. Thirty-three states provide residential, commercial and industrial loan financing for the purchase of renewable energy or energy efficiency systems or equipment. And 22 states and the District of Columbia offer rebate programs to promote the installation of solar water heating or solar panels for electricity generation.
- *Renewable portfolio standards.* Twenty-nine states and the District of Columbia have adopted renewable portfolio standards, which require electricity providers to supply a minimum amount of power from renewable energy sources.
- *Energy efficiency standards.* Nineteen states have established energy efficiency standards for energy generation, transmission and use.

> *Regional clean energy initiatives.* Twenty-three states are participating in three major regional initiatives seeking to increase renewable energy generation and reduce carbon pollution from power plants that causes global warming.
>
> *Vehicle emissions standards.* Fourteen states and the District of Columbia have adopted (and three more states are poised to adopt) California's vehicle emissions standards, which allow states the right to require automakers to reduce carbon emissions from new cars and light trucks more aggressively than federal standards mandate. On May 19, 2009, President Barack Obama established national limits on vehicle emissions by adopting fuel efficiency standards that match California's.

Federal policies. The federal government also has played a critical role, adopting policies and making investments that have spurred economic growth and environmental protection from coast to coast. Laws enacted in the 1960s and 1970s helped develop the recycling, waste reduction and waste management industries. The EPA's Energy Star and Water Sense certification and labeling initiatives long have helped consumers choose and use products that conserve energy and water. And for almost two decades, the U.S. Department of Commerce has helped manufacturers improve efficiency, reduce waste and develop clean technologies and products.

In the last three years, federal policy makers have taken major steps to drive the clean energy economy forward. President Obama's recent efforts to enact stronger fuel efficiency standards built on earlier legislation. In 2007, President George W. Bush signed into law the first congressionally mandated increase in fuel efficiency standards for cars and light trucks in more than 30 years. The Energy Independence and Security Act of 2007 is projected to save consumers $25 billion at the gas pump, save 1.1 million barrels of oil a day and reduce greenhouse gas emissions.

Enacted in February 2009, ARRA—the federal stimulus bill—includes an array of provisions to spur clean energy generation and energy efficiency businesses, jobs and investments. Among the almost $85 billion the package allocates to energy- and transportation-related spending, about $21 billion is dedicated to extending tax incentives for wind, solar and other renewable energy manufacturers. ARRA also provides more than $30 billion for direct spending on clean energy programs, including $11 billion to modernize the nation's electricity grid; $2 billion for advanced battery technology; more than $6 billion for state and local efforts to achieve energy efficiency; $5 billion for weatherization of low-income homes; $500 million for job training to help workers participate in the clean energy economy; and $300 million to purchase thousands of new, fuel-efficient vehicles for the federal fleet from American auto companies.

Moving forward. Given America's need to create enduring jobs and industries while conserving natural resources and reducing carbon emissions, federal leaders are deliberating additional measures to spur the clean energy economy.

President Obama has signaled his support for a federal clean energy plan to reduce greenhouse gas emissions by at least 80 percent by 2050, and a national renewable portfolio standard that would require that 25 percent of the nation's energy supply be derived from renewable sources by 2025. At this writing, the U.S. House of Representatives is considering the American Clean Energy and Security Act, a market-based proposal that would limit overall greenhouse gas emissions and distribute tradable federal allowances for each ton of pollution emitted. The program would apply to electric utilities, oil companies and other entities that produce more than 25,000 tons of carbon dioxide each year. The bill would increase significantly the amount of energy derived from low- or zero-carbon sources, including renewables—meaning that businesses and jobs would be generated to develop clean energy sources to meet the demand.

EXHIBIT 1
THE U.S. CLEAN ENERGY ECONOMY BY THE NUMBERS

By 2007, 68,203 businesses in the United States had generated more than 770,000 jobs in the clean energy economy. And between 2006 and 2008, about $12.6 billion of venture capital investments was directed toward clean technology businesses in 40 states and the District of Columbia. The U.S. clean energy economy is an emerging source of jobs that achieve the double bottom line of economic growth and environmental sustainability. Every state has a piece of America's clean energy economy.

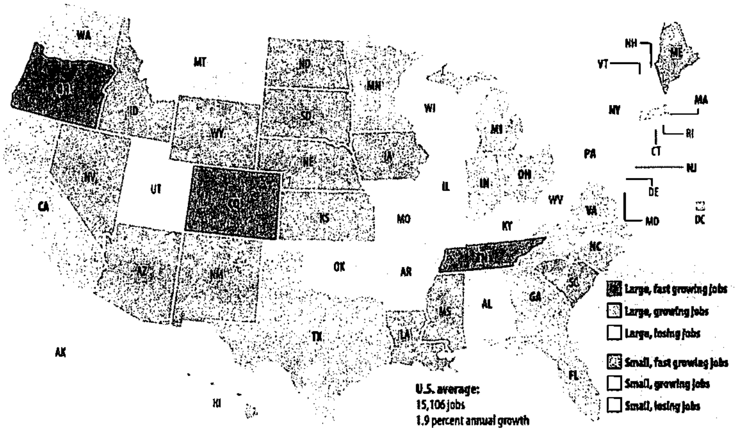
	CLEAN BUSINESSES 2007	CLEAN JOBS 2007	CLEAN JOB GROWTH 1998-2007	OVERALL JOB GROWTH 1998-2007	VENTURE CAPITAL 2006-2008 (thousands)
Alabama	799	7,849	2.2%	1.6%	$0
Alaska	350	2,140	9.4	15.7	0
Arizona	1,123	11,578	21.3	16.2	31,106
Arkansas	448	4,597	7.8	3.5	22,845
California	10,209	125,390	7.7	6.7	6,580,427
Colorado	1,778	17,008	18.2	8.2	622,401
Connecticut	857	10,147	7.0	-2.7	30,050
Delaware	211	2,368	-2.3	-8.9	3,342
District of Columbia	280	5,325	18.8	-7.1	89,877
Florida	3,831	31,122	7.9	22.4	116,980
Georgia	1,827	16,222	10.8	15.7	179,686
Hawaii	356	2,732	43.6	7.3	12,304
Idaho	428	4,517	126.1	13.8	27,890
Illinois	2,176	28,395	-2.5	-2.5	108,519
Indiana	1,268	17,298	17.9	-1.0	26,000
Iowa	729	7,702	26.1	3.6	149,237
Kansas	591	8,017	51.0	-0.3	13,275
Kentucky	778	9,308	10.0	3.6	0
Louisiana	995	10,641	19.5	3.0	0
Maine	725	6,000	22.7	3.3	0
Maryland	1,145	12,908	-2.4	1.3	323,996
Massachusetts	1,912	26,678	4.3	-4.4	1,278,462
Michigan	1,932	22,674	10.7	-3.6	55,099
Minnesota	1,206	19,994	11.9	1.9	49,938
Mississippi	454	3,200	24.8	3.6	30,384
Missouri	1,062	11,714	5.4	2.1	24,480
Montana	408	2,155	0.2%	12.7%	$0
Nebraska	368	5,292	108.6	-4.9	0
Nevada	511	3,641	28.8	26.5	19,804
New Hampshire	465	4,029	2.0	6.8	66,917
New Jersey	2,031	25,397	-9.6	-2.7	282,568
New Mexico	577	4,815	50.1	1.9	147,913
New York	3,323	34,363	-1.9	-2.6	209,590
North Carolina	1,783	16,997	15.3	6.4	82,571
North Dakota	137	2,112	30.9	9.4	0
Ohio	2,513	35,267	7.3	-2.2	74,224
Oklahoma	693	5,465	6.8	2.4	5,192
Oregon	1,613	19,340	50.7	7.5	70,002
Pennsylvania	2,934	38,763	-6.2	-3.1	232,897
Rhode Island	237	2,328	0.7	0.6	22,845
South Carolina	884	11,255	36.2	2.2	0
South Dakota	169	1,636	93.4	4.9	0
Tennessee	1,090	15,507	18.2	2.5	16,329
Texas	4,802	55,646	15.5	6.7	716,894
Utah	579	5,199	-12.4	10.8	26,957
Vermont	311	2,161	15.3	7.4	53,747
Virginia	1,446	16,907	6.0	6.6	70,828
Washington	2,008	17,013	0.5	1.3	635,109
West Virginia	332	3,065	-4.1	0.7	5,741
Wisconsin	1,294	15,089	-5.2	3.4	46,743
Wyoming	225	1,419	56.4	14.0	6,942
U.S. Total	68,203	770,385	9.1	3.7	12,570,110

NOTE: Venture capital values are adjusted for inflation and reported in 2008 dollars. See appendices for the complete data sets.
SOURCE: Pew Charitable Trusts, 2009, based on the National Establishment Time Series Database and data from the Cleantech Group™ LLC; analysis by the Pew Center on the States and Collaborative Economics

EXHIBIT 10

WHERE ARE THE JOBS IN THE CLEAN ENERGY ECONOMY?

Looking simultaneously at the total number of jobs (large or small) and their average annual growth rate (fast growing, growing or losing), states' clean energy economies fall into six groups: large and fast-growing jobs, growing jobs or losing jobs; and small and fast-growing jobs, growing jobs or losing jobs. Large states had more jobs in their clean energy economies in 2007 than the national average of 15,106 jobs. Small states had fewer than the national average of clean energy economy jobs. States with fast-growing clean energy economies experienced average annual growth between 1998 and 2007 that exceeded the national average of 1.9 percent. Growing states had a positive average annual rate of growth less than 1.9 percent and losing states have experienced negative growth.



STATE	TOTAL CLEAN JOBS 2007	AVG. ANNUAL GROWTH 1998-2007
Alabama	7,849	0.31%
Alaska	2,140	1.14
Arizona	11,578	2.19
Arkansas	4,597	0.99
California	125,390	0.88
Colorado	17,008	1.98
Connecticut	10,147	1.11
Delaware	2,368	0.23
District of Columbia	5,325	2.13
Florida	31,122	0.90
Georgia	16,222	1.18
Hawaii	2,732	4.29
Idaho	4,517	10.11
Illinois	28,395	–0.25
Indiana	17,298	1.88
Iowa	7,702	2.66
Kansas	8,017	4.74
Kentucky	9,308	1.09%
Louisiana	10,641	2.06
Maine	6,000	2.34
Maryland	12,908	–0.11
Massachusetts	26,678	0.52
Michigan	22,674	1.20
Minnesota	19,994	1.38
Mississippi	3,200	2.57
Missouri	11,714	0.71
Montana	2,155	0.15
Nebraska	5,292	10.00
Nevada	3,641	3.15
New Hampshire	4,029	0.44
New Jersey	25,397	–1.08
New Mexico	4,815	4.73
New York	34,363	–0.14
North Carolina	16,997	1.62
North Dakota	2,112	3.17%
Ohio	35,267	0.85
Oklahoma	5,465	0.89
Oregon	19,340	4.77
Pennsylvania	38,763	–0.48
Rhode Island	2,328	0.37
South Carolina	11,255	3.56
South Dakota	1,636	7.89
Tennessee	15,507	2.14
Texas	55,646	1.70
Utah	5,199	–1.31
Vermont	2,161	1.69
Virginia	16,907	0.66
Washington	17,013	0.23
West Virginia	3,065	–0.36
Wisconsin	15,089	–0.55
Wyoming	1,419	5.16

SOURCE: Pew Charitable Trusts, 2009, based on the National Establishment Time Series Database; analysis by Pew Center on the States and Collaborative Economics.

EXHIBIT 11.
STATE LEADERS IN JOBS ACROSS THE CLEAN ENERGY ECONOMY BY CATEGORY

Although California leads in overall employment in each category, a closer look reveals other notable trends. Arizona makes the top 10 in Clean Energy but in no other category. Massachusetts, New York and Ohio are among the top 10 in all but one category.

While Arizona, Arkansas, Iowa, Maine, Nebraska, Wisconsin and the District of Columbia each have fewer than 15,106 jobs in the clean energy economy—the national average—they rank among the top 10 states in one of the five categories. In all, nearly half the states rank among at least the top 10 states in at least one category of the clean energy economy.

Clean Energy	JOBS 2007	Energy Efficiency	JOBS 2007	Environmentally Friendly Production	JOBS 2007	Conservation and Pollution Mitigation	JOBS 2007	Training and Support	JOBS 2007
California	27,672	California	10,510	California	13,666	California	64,799	California	8,743
Pennsylvania	10,099	Texas	6,353	Minnesota	3,815	Texas	40,617	New York	3,499
Minnesota	4,030	Ohio	5,367	Oregon	3,304	Pennsylvania	24,703	Illinois	3,216
Ohio	3,653	Oregon	4,893	Ohio	2,800	Florida	24,686	Massachusetts	3,155
Texas	3,479	New York	3,311	Iowa	2,237	New York	23,082	District of Columbia	3,130
New York	3,421	Wisconsin	2,801	Texas	2,223	Ohio	22,296	Texas	2,974
Michigan	2,941	Maine	2,560	Nebraska	2,162	New Jersey	20,060	Florida	2,249
Massachusetts	2,890	Massachusetts	2,553	Illinois	1,921	Illinois	19,631	Virginia	1,755
District of Columbia	2,728	Virginia	2,135	Colorado	1,361	Massachusetts	17,374	Pennsylvania	1,742
Colorado	2,639	Florida	2,071	Arkansas	1,303	Michigan	15,852	North Carolina	1,659

SOURCE: Pew Charitable Trusts, 2009, based on the National Establishment Time Series Database; analysis by Pew Center on the States and Collaborative Economics.

economy as of that year, it was a close second with 0.85 of its overall jobs dedicated to the clean energy economy. At the other end of the spectrum, 0.24 percent of Mississippi's total jobs were part of the clean energy economy in 2007, although the state's number of jobs in this area was growing.

Analysis Three: Growth of Jobs in the Clean Energy Economy Compared with Overall Jobs Growth

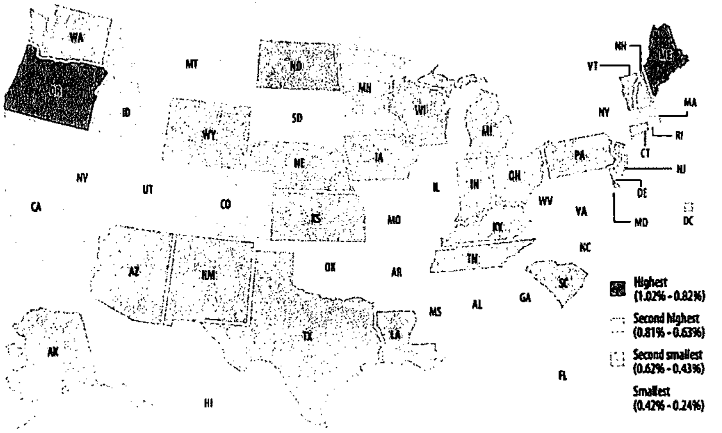
Nationally, jobs in the clean energy economy grew by an average of 1 percent annually during the past 10 years, while total employment grew by an average of 0.4 percent annually. In 38 states and the District of Columbia, job growth in the clean energy economy outperformed total job growth between 1998 and 2007. In a number of states, job gains in the clean energy economy have helped lessen total job losses.

Job growth in the clean energy economy eclipsed growth for all jobs by more than 2 percent in 11 states: Hawaii, Idaho, Iowa, Kansas, Mississippi, New Mexico, North Dakota, Oregon, South Carolina, South Dakota and Wyoming. Oregon's large and fast-growing clean energy economy, for example, has dwarfed the growth of overall jobs in the state, expanding by an average of 4.8 percent compared with an average of less than 1 percent annually. This growth is not limited to one industry or job type: Oregon's jobs in the clean energy economy have experienced marked growth during the past 10 years in all five of Pew's categories. And although North and South Dakota have very small clean energy economies, the growth of these jobs in both states has outpaced their growth of total jobs. In North Dakota, overall jobs grew by 1.0 percent, but jobs in the clean energy economy grew by an average of 3.2 percent. In South Dakota, overall jobs grew by

EXHIBIT 12

CLEAN ENERGY ECONOMIES AS A SHARE OF STATES' OVERALL ECONOMIES

It is important for states to know just how many of their total jobs fall within the clean energy economy. Nationally, jobs in the clean energy economy accounted for 0.49 percent of all jobs in 2007; 22 states exceeded that national average.



	TOTAL JOBS	PERCENT CLEAN
Alabama	2,193,589	0.36%
Alaska	388,361	0.55
Arizona	2,661,437	0.44
Arkansas	1,366,809	0.34
California	17,556,872	0.71
Colorado	2,668,069	0.64
Connecticut	2,150,723	0.47
Delaware	502,773	0.47
District of Columbia	1,021,958	0.52
Florida	9,903,922	0.31
Georgia	4,955,677	0.33
Hawaii	651,894	0.42
Idaho	718,373	0.63
Illinois	6,792,326	0.42
Indiana	3,348,351	0.52
Iowa	1,800,264	0.43
Kansas	1,531,164	0.52
Kentucky	2,069,602	0.45%
Louisiana	2,326,888	0.46
Maine	707,195	0.85
Maryland	3,108,256	0.42
Massachusetts	3,870,356	0.69
Michigan	5,279,234	0.43
Minnesota	3,143,012	0.64
Mississippi	1,356,603	0.24
Missouri	3,178,657	0.37
Montana	512,093	0.42
Nebraska	1,038,673	0.51
Nevada	1,280,532	0.28
New Hampshire	735,051	0.55
New Jersey	4,957,892	0.51
New Mexico	970,632	0.50
New York	9,964,700	0.34
North Carolina	4,629,118	0.37
North Dakota	422,054	0.50%
Ohio	6,304,302	0.56
Oklahoma	1,784,492	0.31
Oregon	1,902,294	1.02
Pennsylvania	6,542,137	0.59
Rhode Island	549,754	0.42
South Carolina	2,059,151	0.55
South Dakota	444,659	0.37
Tennessee	3,144,614	0.49
Texas	11,726,811	0.47
Utah	1,291,211	0.40
Vermont	365,646	0.59
Virginia	4,238,337	0.40
Washington	3,098,042	0.55
West Virginia	792,474	0.39
Wisconsin	3,150,000	0.48
Wyoming	302,245	0.47

SOURCE: Pew Charitable Trusts, 2009, based on the National Establishment Time Series Database; analysis by Pew Center on the States and Collaborative Economics.

of Columbia have had at least one registered clean technology patent in the past 10 years. Exhibit 15 shows the 10 states with the highest number of patent registrations from 1999 to 2008. See Appendix E for the 50-state table.

EXHIBIT 14
VENTURE CAPITAL INVESTMENTS

Top 10 states attracting venture capital investments in companies in the clean energy economy, 2006-2008. In millions.

California	$6,580
Massachusetts	1,278
Texas	717
Washington	635
Colorado	622
Maryland	324
New Jersey	283
Pennsylvania	233
New York	210
Georgia	180

NOTE: Investment values are adjusted for inflation, reported in 2008 dollars and rounded to the nearest $1,000,000.

SOURCE: Pew Charitable Trusts, 2009, based on data from The Cleantech Group™ LLC; analysis by Pew Center on the States and Collaborative Economics.

EXHIBIT 15
CLEAN TECHNOLOGY PATENTS

Top 10 states in clean technology patent registrations 1999-2008

California	1,401
New York	909
Michigan	749
Texas	414
Connecticut	404
Massachusetts	384
Ohio	309
Illinois	297
Georgia	256
New Jersey	248

SOURCE: Pew Charitable Trusts, 2009, based on data from 1790 Analytics; analysis by Pew Center on the States and Collaborative Economics.

Senator BOXER. You said these jobs are transitory. False. We show the last 10 years of growth, the big star has been the clean energy jobs. And that is why, and it doesn't even count the last year. This is just to 2008. We have had $6 billion plus of venture capital funds. We have had 1,400 patents. That doesn't even count this year. And in 2007, so it doesn't even count the last 2 years, 125,000 jobs and 10,200 businesses.

What I am trying to tell you is—I could say this. I would say this about the coal industry. All of us on this committee are trying to make sure that we can, in fact, use the coal we have. We want to. We think it is important that everybody play a part in this.

Without this legislation, and the—I forget, $100 billion we are going to pump into clean coal; $100 billion from these allowances. The chances are the coal industry's future, not good. And here is the reason. We have laws in this country. One of them is the Clean Air Act. We now know that greenhouse gas emissions are covered under that Clean Air Act. We know an endangerment finding was put together by the Bush administration, but it was deep sixed and never came to light. We now know what it said, and it is what our Administration said.

So our point of view is that we are working with our coal Senators, and I was very pleased that Senator Byrd's comment, which is he is pleased with the improvements we are making in the bill to help coal country. They want to do a lot more, and I am sure you are going to see a lot more.

But I just wanted to put in the record, as we will put in definitely your eloquent testimony and your heartfelt testimony. In my State, these jobs have been the leaders.

Now, I brought this over here, reductions from business as usual. I wanted to share it with Senator Klobuchar and Senator Cardin and Senator Inhofe, where we could see it a little bit better because this counters what Mr. Murray said about the rest of the world.

Would you go through that chart again, Mr. Helme, and tell us what it shows, and where you got your documentation?

Mr. HELME. Happy to.

Senator BOXER. Do you want to stand up and go over there?

Mr. HELME. Oh, sure.

Senator BOXER. You won't have a mic, but that is OK.

Mr. HELME. There is probably not room. Probably easier to do it from here.

Senator BOXER. OK. Can you see it?

Mr. HELME. Yes, I can see it fine from here.

Senator BOXER. OK.

Mr. HELME. So this is a comparison of what three key developing countries have done with laws that are on the books today that are being implemented and that are not for generating credits to be sold under the clean development mechanism. So these are unilateral reductions by Brazil, Mexico and China.

And you can see the total there is almost 2 billion tons. You know, our national emissions are about 6 billion, so it is a third of our emissions today. But just to give you a sense, and that is made up of about 1.5 billion from China, this energy intensity program and some of the other things they have done where they are cutting their energy intensity by 20 percent in every sector of the economy. And they have been measuring this each year. They are already well over 12 percent on the way to that 20 percent. It will be complete in 2010.

For Brazil, it is the last 2 years of significant reductions in deforestation, several hundred million tons. And for Mexico, it is the new Mexican program that my colleague Jonathan Lash alluded to, where they are going to get about 50 million tons by 2012. So that is the combination of how we get those tons.

The gray on the far left is the first phase of Kerry-Boxer by 2015. Remember, everything isn't kicking in 2015, so that is why it is quite a bit smaller. And the green is Kerry-Boxer, the first part of the graph, the lighter green, is the cap itself on U.S. sources. And the upper piece, the supplemental red, is your provisions to take 5 percent of the allowances, set them aside, invest them in Brazil and Indonesia and so on, and get reductions, not offsets, reductions in those countries in addition.

So you can see sort of what the total is. In thinking about that, you can see that in terms of our cap compared to what China, Brazil and Mexico are doing, they are actually doing more. When you add the additional effort your bill suggests, then it is a bigger effort in terms of Kerry-Boxer.

And then the final one is the E.U., and it shows you where the E.U. would be a minus 30. Now, the E.U. has said they will do minus 30 if everybody else steps up. If not, they will only do minus 20. If they did minus 20, obviously they would be smaller than China, Brazil and Mexico.

So the point here is this myth that developing countries are not moving and that they are only doing stuff that we pay for is flatly a myth, and this shows you that.

Senator BOXER. OK.

Mr. Podesta, I know from listening to you that you believe we have to take strong action now. Why is it important, if you could expand, because you said it very clearly. Why is it important to act quickly to maintain our competitive edge? And if we fail to do it, you know, what price do our workers pay, do our businesses pay, do our people pay?

Mr. PODESTA. I tried to highlight what other people are doing investing in these technologies of the future. It is clear that in the 21st century, we are going to turn over our energy platform, if you will, from the one that Mr. Murray described, which is really one of the late 19th century perhaps, rather than even the 20th century, to a cleaner, newer, greener energy future.

And I will repeat one statistic I gave. In 1995, the United States had 45 percent of the photovoltaic market. Today, we have less than 10 percent. China, in contrast, has 40 percent. There are still strong American solar companies importing cells from China, manufacturing them here, putting them on buildings here. If we want to create an engine of innovation, of growth, if you look at where venture capital is going in the United States, it is in these clean energy industries.

But they need policy signals. They need the support that is being provided by this bill both to push renewable energy, energy efficiency, but ultimately to put a price on carbon so that we begin that path toward a clean future.

Senator BOXER. OK.

Senator Inhofe, I will give you an extra minute and a half.

Senator INHOFE. Oh, that is——

Senator BOXER. No, no. We will give you an extra——

Senator INHOFE. Well, thank you, Madam Chairman.

First of all, I say to my friend, Mr. Podesta, you have always been one of my most respected adversaries, and I appreciate very much the comment you made about natural gas. Because as you know, and I think everyone knows, the successes in using it as a fuel in liquefied natural gas, now compressed natural gas.

But there are bureaucratic problems with that. I have a bill, the Fueling America Act, and I have Democrats and Republicans on that, to accomplish what you want. So I would like to have you take some time to look at it, and maybe want to publicly endorse it. I think you probably would.

The comments that were made, Mr. Helme, by you and Mr. Podesta, about China. You have to keep in mind, China is still cranking out two a week of the coal-fired plants. Now, things are going well in China now. I imagine they are going to continue to go well if they keep that up, because as our manufacturing base seeks the energy necessary to operate, that is like where they would go.

Mr. Murray, I want to get some more details on the cap and trade and how it is working in Europe. As you know, it is interesting that the European Environment Agency, Madam Chairman, the EEA, reported in August that Europe is now likely to meet its Kyoto targets. And they go on to elaborate, this is the EEA, the reason emissions reductions “reflect the effects of global economic recession which began in 2008, which resulted in reduced industrial output and reduced energy consumption by industry and correspondingly reduced freight transportation.” So Europe is on track primarily because of the recession.

So Mr. Murray, this is pretty relevant as to what is happening. It is because there is a view in the Senate that the Kerry-Boxer 20 percent target reductions by 2020 is not that big of a leap because, get this, America is in a recession and emissions have dropped. Well, what has happened over there is happening over here now. This is, in fact, a global recession, which you have taken into consideration as you look at this chart over here.

So anyway, give me a sense, Mr. Murray, of what our economy would have to look like, let’s say in 2030 when the Kerry-Boxer target of 42 percent, more than double the 2020 target; how many jobs would we have to lose? How many businesses would we have to shut down to meet the targets of this bill? Any idea?

Mr. MURRAY. Well, Senator, one thing that we do know is that certainly over here, obviously business conditions and in Europe and business conditions here are not directly comparable. But we do know that from the latest data on CO_2 emissions from 2008 for the United States, that CO_2 emissions dropped about 2.8 percent. Job losses from December, 2007 to 2008 were 3 million, just over 3 million. So that is about just over 1 million jobs for the percentage cut in CO_2. Of course, this ratio might not hold true for international cuts, but that is about the level that we are looking at.

To get to the sort of 20 percent level of reduction, then we would be looking at at least 20 million jobs lost, I would imagine, quite possibly rather more.

Senator INHOFE. I see. And I am going to be attending, at least I am planning to, the Copenhagen conference. I am interested in your view as to what we should expect. I guess now that President Bush is out of office that they will reach an international agreement, and everyone will be happy. Is that what you think is going to happen?

Before you answer the question, let me tell you what I think, what Evan DeVore, what is his title? He is the top climate change official for the U.N. He made the statement, "A fully fledged new international treaty under the framework, I don't think it is going to happen. If you look at the limited amount of time remaining and where we are today, it is clear."

Do you agree with him on that?

Mr. MURRAY. Well, I think I can tell you what I think the press reports will be like. I think that at the last minute an historic agreement will be reached, tears will be shed, champagne corks popped. The USA, I think, will still be blamed for the near failure to reach agreement. But in the cold light of day, the agreement is simply going to be an agreement to talk again.

The developing world, as Minister Ramesh of India has said, will not accept mandatory emissions reductions. The developed world will accept some non-binding targets for the medium term and may promise some funding for the developing world. But I think that next year the clamor will simply begin again for a comprehensive treaty to be negotiated at the COP meeting next December, and the same accusations will be hurled between developing and developed nations as we have seen this year.

I think this cycle is going to continue as long as emissions reductions are the focus of lobbying efforts and not adaptation, building resilience, and research into new technology.

Senator INHOFE. OK, thank you.

Mr. Helme and Mr. Lash, you heard what Mr. Podesta said in terms of natural gas. I would like to ask you if you agree with his comments. And then for the three of you, including you, Mr. Podesta, your thoughts about China's increasing or the continued use and development of coal-fired generating plants.

First on natural gas, do you agree with him on his comments?

Mr. LASH. I do, Senator. I favor anything that reduces CO_2 emissions, nuclear power, natural gas, energy efficiency, all of it. We need it all.

Senator INHOFE. I agree we need it all.

Mr. LASH. Second, on China, a significant part of what China has been doing has been replacing old, inefficient, small power plants with larger, much more hypercritical power plants. So their coal fleet is now more efficient than the U.S. coal fleet. The Chinese understand exactly what was implied by President Hu's commitment to make a quantitative reduction in their CO_2 intensity, and I believe they are going to implement it.

Senator INHOFE. Thank you.

Mr. HELME. I would agree with Jonathan. I think natural gas is a very promising option. With the development of shale gas in this country, gas prices have separated from oil prices. So we see that as a very attractive near term option for reducing CO_2 emissions.

Senator INHOFE. Well, I think that is right. When it came out last week and said that we were number on in terms of reserves, that wasn't even counting shale. So there is huge potential there.

And I also agree when you talk about all of the above, that is what we have been saying all along. We need oil, gas, coal, nuclear and renewables.

Mr. HELME. And I agree with Jonathan on the question about China. They are, in fact, retiring a lot of small coal plants aggressively. They also have the most aggressive wind and renewable energy program in the world. They were No. 1 in investment last year, $10 billion, of any country in the world. And they have met their targets. Every time they set a target in a 5-year plan, they have actually beaten those targets, and they plan to do that. They see this, as Mr. Podesta indicated, a huge opportunity.

Also, one that you will be interested in, nuclear, they originally had nuclear not as part of their strategy, nine gigawatts out of their whole thing. They are going to go to 70 gigawatts.

So they are looking at a number of options that are promising in terms of the climate picture.

Senator INHOFE. Thank you.

Senator BOXER. Yes, finish up if you can.

Mr. PODESTA. Just very briefly, I think that, to put some numbers on this, just since 2006, they have closed down more than 34, maybe as much as 50 gigawatts of power in China from small boilers. They have made a pledge to close 30 gigawatts more in the next 3 years.

And I think that with respect to these investments that China is making, Ned said that they are eating our lunch. I suggested to my staff a bit ago, a different body part that begins with kicking, but they told me I couldn't use that in the committee hearing.

But I think that their investments are just astronomical. I would suggest that the committee might take the time—you might want to go over and review that.

With respect to gas, Senator, I made the point that I think that replacing, particularly backing out oil, which has CO_2 benefits, but it also has profound energy security benefits, to try to reduce our dependence on imported foreign oil, and move that base, particularly for heavy duty trucks, to domestically produced natural gas is now available to us because we can exploit these vast unconventional sources, particularly the oil shales.

Senator INHOFE. Thank you.

Senator BOXER. I am going to call on Senator Klobuchar.

I just want to point out, Mr. Chairman, we have a natural gas title in our bill which was not in the House bill. We are moving forward. A lot of us agree with your point of view there. And we also have a nuclear title. And I think, you know, my Republican friends, I know where they are coming from on this. But I think there is room for us to work together, I hope.

And the last point I would make, I don't know where you come up with 20 million jobs lost. You kind of got that off the top of your head. So I just want to make sure that you know that the studies that we have looked at from the Center for American Progress to the Pew Charitable Trust to the EPA analysis all predict job growth in America of about 2 million jobs.

So I just needed to say we will put your testimony in, as well as those studies.

Senator INHOFE. Well, let me say——

Senator BOXER. Yes?

Senator INHOFE. On the nuclear and the addressing natural gas, it needs to be a lot stronger, and perhaps you will be working in that direction.

Senator BOXER. We will be working on the floor, absolutely. And we hope that you will work with us.

Senator Klobuchar, the floor is yours.

Senator KLOBUCHAR. Thank you.

I just wanted to follow up with some of the last questions that were asked about China. I know that the Wall Street Journal reported that this summer for the first time that investment worldwide in renewable energy outpaced traditional energy, and that China accounted for 10 percent of the world's total, and that the Chinese government will invest $462 billion, that is nearly a half-trillion, in renewable.

I know that, Mr. Podesta, you kind of let out, dangled out there where they are investing. Could you elaborate a little bit more about what they are doing and what repercussions this could have for our country, which oftentimes developed a lot of this technology but now has been leapfrogged by these other countries?

Mr. PODESTA. Yes. They are making major investments in wind. They are already the largest producer of photovoltaic cells. A lot of that is for the export market. They have now recently created the right kinds of investments so that a lot of that production is going to being installed in China.

A major investment on the transportation sector. I referenced the $300 billion they are spending on building out the rail and high speed rail. They intend to by 2011 produce 14,000 kilometers of high speed rail. I know that the stimulus bill put $8 billion into that. I wonder how many miles you think the United States will actually have built by 2011 of high speed rail going 200 miles an hour in intercity transportation, which has both reduced congestion and really reduced their air traffic between their cities. They are making major investments in building efficiency and in new technologies.

They are using—this is one place where American companies have been invited into the Chinese market. I think Secretary Locke is over there arguing that we need to have more access to the Chinese market for American companies. One place where we have had some access is on building controls in particular, where the United States leads the world.

But particularly, our wind manufacturers and others have been locked out of the Chinese market or blocked out because of their procurement rules there. So I know that Secretary Locke is pressing ahead to open up access particularly for American companies.

Senator KLOBUCHAR. I just had a hearing back in Minnesota on exports and small businesses. And you know, there are these little solar companies there, places that are just dying to get into this market. And again, part of it is that we haven't sent, what you pointed out, the kind of market signals to make it easier. It feels to me sometimes that these little companies are way steps ahead of this town in terms of understanding of the demand out there.

The other thing that we talked about at this hearing we had is just that the dollar is weak. There are some excellent—as bad as it can be for other reasons, there are some very good possibilities for us to actually export. And when you look at—maybe you want to comment on how we are doing vis-à-vis Europe, because if you just say, oh, it is labor costs, I mean, they have similar labor costs to ours. And yet they have taken a lot of this solar market and they have also accounted for 82 percent of meeting world demand in 2008. Spain was the No. 1, followed by Germany.

You know, what are our prospects for moving ahead in terms of this energy race? We won the space race in the 1960s, and that was because we put a singular focus of this Nation in getting ahead. What do you see as our prospects of moving up in the ranks here? Mr. Helme.

Mr. HELME. Well, I think it is critical. And I think the bill that you have before you will help in that regard.

I just wanted to add on this China question, you know, we often think of the Chinese 5-year plans. Oh, this is the plan, and they are not really going to make it. Look at renewables. They had a target of 30 gigawatts of wind by 2010. They have upped that to 100 because they passed the 30 gigawatts in 2006. Same thing in solar. They were at 1.8 gigawatts. They moved that up to 10 because they beat the solar target.

Senator KLOBUCHAR. So are they going to have their own renewable electricity standard?

Mr. HELME. Yes, they do. They have an RPS like you do in Minnesota. It is 15 percent. And I think very likely, President Hu will announce as part of the Copenhagen scene that they are going to step that up even further. I think we can expect a significant move there and similarly on hydro.

And I think the other thing that is interesting, I understand the discussions with the U.S. on this bilateral agreement on technology, we would have thought CCS would be the top of the list. Apparently, some of the ball bearings that are in these windmills are the kinds of technologies China is saying we really want collaboration with the United States on these technologies.

So it is a very serious business, and you know, it is a sign that we are seeing real movements. And I think for us, as Mr. Podesta said, you know, we need some real incentives to help those companies because these guys are out there, and they are fast, and they want our technology, and they want to manufacture it in China.

Senator KLOBUCHAR. Yes, I have been actually frustrated with the renewable standard we have right now. It is not coming through this committee, but the bill in the House and the one in the Senate Energy Committee is arguably about where we are. It is not aggressive enough. And I know that Senator Udall has been working on this as well. We have a bill that is similar to the Minnesota standard because we have just seen this growth in the green jobs in our State while the rest of it has been—we haven't seen that kind of growth.

And it was again a bi-partisan Republican Governor signed it; nearly unanimous support from our legislature, Democrat and Republican. And people believe in it, and we are seeing that kind of job growth.

And so when I have seen that in our State and seen the buy-in from people because they can get a piece of the benefits, I just don't understand the kind of resistance that we are seeing to an electricity standard when you see what has happened in these other countries.

Mr. HELME. And it makes a huge difference on the CO_2 front, because once you have built those plants, we have done the modeling in a number of States, once they are built, you run them, and that is what we are seeing in China. China is saying, you know, I showed you that chart with 1.5 billion tons with their energy efficiency. There is another 1.2 billion tons in the renewables available, huge.

Senator KLOBUCHAR. Right.

Mr. HELME. So once you have done it, and I think it makes sense that both cap and trade and the renewables standard, not just cap and trade, because you don't necessarily build the renewables if you just have cap and trade. If you build the renewables first, then the cap and trade pushes you to run them harder, which is great.

Senator KLOBUCHAR. All right. Thank you.

Senator CARDIN. Let me proceed, if I might. Let me first start in asking my question to acknowledge that I strongly support the United States moving forward. I think it is in our economic interest to do that regardless of what happens internationally.

But I do believe the international community is responding. And your testimonies here today certainly give us chapter and verse of what is happening in the major countries of the world and where the United States, if we want to be competitive, we are going to have to move, or otherwise we are going to lose jobs. So it is important that we take action.

And I also just really want to respond to some of the concerns Mr. Murray has raised. If we are successful in Copenhagen, and I certainly hope we are successful in Copenhagen, it is going to be a first step. We have a lot of work to do after Copenhagen.

I mean, in Copenhagen we hope that we have commitments to move toward targets, and we have a mechanism to get us to those goals and that there is an adequate financing mechanism to deal with the legitimate concerns of the developing world.

And I want to see in Copenhagen also a commitment to move forward on an issue that you raised, and I think several have raised during the course of the last 3 day, and that is the concern of leakage and the concern of enforcement.

So what I hope will happen, and we know that in the House-passed bill there was a provision for what is basically a border adjustment in the event that the United States moves forward and other countries do now, that their products would be subject to a border adjustment for the cost of the carbon reductions that are not reflected in that product.

And what I have been urging is that we would be much better off doing this in Copenhagen under the framework of a global climate agreement than under the WTO being challenged where it is unclear as to whether that is an adequate mechanism to deal with this issue.

If we were successful in getting that type of negotiations in a climate agreement, then you really are saying that you have an international responsibility to meet your international targets, not what one country says you need to meet, but what the international community has said that you meet.

And by the way, the adjustments could go to international funds. It doesn't have to go to a particular country, so they really are achieving the goal set out in climate change legislation.

Now, I have been told this is going to be difficult. It is going to be difficult to get China or India or other countries to agree on this. Everything is difficult. Nothing is easy in the international community.

But I do think that the concern of individual countries action, which is a red flag internationally, as well as the political concern that the United States may very well act, and if India and China do not, does that mean that we are not going to achieve our international targets, can be answered through an enforcement mechanism that speaks to each country having to meet its international responsibilities.

John Podesta is one of my heroes on these issues. I welcome your thoughts, Mr. Helme. I welcome your thoughts, Mr. Lash, Mr. Murray, as to whether this mechanism makes sense.

Mr. PODESTA. Well, Senator, I think that there is a timing question. I think the bill basically proceeds in the right direction, which is to take the trade sensitive and energy sensitive industries and provide extra allocation to them so that they are buffeted from any increase in their cost in the near term while we work out the border adjustment assistance procedures.

I think in my own view that needs to happen, but chances of that happening between now and Copenhagen I think are relatively small. And I think the one thing that I think all of us would probably agree with is that, and I certainly agree with what Mr. Helme said, we are going into, Copenhagen is not Kyoto. We are going into a different framework.

And I think it is really critical that the national commitments that we have talked about here today, from the Chinas, from the Indias, from the Brazils, from the Indonesias, from the South Koreas, Mexico be worked into and bound to in an international agreement so that we can see the overall picture.

Senator CARDIN. With enforcement?

Mr. PODESTA. And people take on internationally binding commitments. That is my hope.

Senator CARDIN. With enforcement?

Mr. PODESTA. With enforcement. I think that goes to the question of being verifiable, measurable, and having a mechanism that you really have integrity in the system, which again Mr. Helme discussed. But I think that is the first step.

And as we are doing that, we need to work out these border adjustment questions, but I think they are best worked out in the way the Chairman's mark does it, which is to provide those allocations in the near term.

Senator CARDIN. With the Chairman's permission, I would like Mr. Helme to respond.

I would just urge you all to just get stronger international interest on dealing with the enforcement issue. I mean, I think it is a critically important issue for us to resolve in America, to get our bill done. But it is also important to reach the international targets. It is going to be an issue in every country.

Mr. Helme, if the Chairman——

Mr. HELME. I agree completely with Mr. Podesta's thoughts on this question of the border tax adjustment. In fact, India and China have talked about putting a provision in the treaty that says you cannot have border tax adjustments. So I think it would be a very tough sell, but I think your question about enforcement is critical, and we do need to go there.

This is one place where I have been happy with where our delegation has come forward. They basically suggested that we use a model where each country would do national communication with all of its data, its inventories, every 2 years. Currently, developing countries can do it when they please. They don't have to do it every year.

I think they are agreeable to it. I sat down with the Indians. They were willing to go for this route. Every 2 years, you have a monitoring, and you have reporting. You set it up like the WTO, and I am not a WTO lawyer, but my understanding of the way the WTO works is you put your stuff on the record, your performance. You are open to question from all the other parties, the other countries in the U.N. process, and there is a name and shame sort of process here to really focus the light of day on what we are and what we are doing. So I think that is a doable way to get there.

The other piece that is critical, though, Senator, I think is that we also have to look at what our compatriots in Annex I, the developed countries, are doing. We can't argue that, oh, we can't have these international standards. There is a real fear on the part of our delegation of what the Senate thinks, and they, oh, we shouldn't have international standards because we shouldn't have anything more than China is doing.

And my sense is, in fact we desperately need those international standards so that it is transparent, so we can all see it, and in that kind of WTO process it is very public what is going on because that is the heart of how we get this done.

Senator BOXER. Thank you.

Senator Udall.

Senator UDALL. Thank you, Madam Chair.

And thank you to the panel. It is great having you all here today.

Mr. Lash, you testified that the Chinese government knows its energy use is unsustainable, which is in contrast to some members of this committee that believe that China will never take action to reduce emissions. What makes you believe China is changing? Are there statements by its leaders or facts on the ground? I mean, what is happening? I am going to expand it out to the panel after you speak on this subject.

Mr. LASH. So, all three of the indicators that you mentioned are present. The Chinese signed on to the commitment this summer that we should limit emissions in order to achieve no more than a 2 degree warming. They understand that that is impossible to achieve if their emissions continue to grow at the current rate.

President Hu Jintao explicitly and unequivocally committed China to reduce their carbon intensity in coming years, and they have done that rapidly over the last 4 years, and will, as we have said often, by next year have done a 20 percent.

We have talked about the whole set of policies they are implementing to reduce their energy growth. But what is much more important is that they are acutely aware that they will have to commit to a date at which their emissions peak and start down. The world can't do this without both the U.S. and China committing to that process.

And they understand that by buying the 2 degree target and by buying into a Copenhagen agreement, they are accepting that they will have to start their emissions down.

I spent last week in China. I met mostly not with government officials but with business leaders of non-state owned enterprises. And President Hu's speech had a profound impact on them. They all accept that they will be operating in a low carbon market, that the incentives are all going to be for this new economy, not the old economy. They are going there.

Senator UDALL. Mr. Helme or Mr. Podesta.

Mr. HELME. Yes, I would agree with Jon and couldn't say it better than the way Jonathan said it. And I think this last point is critical. Up until that speech in New York a month ago, it was all about energy efficiency. It was all about things that were win-win, that made sense. You know, they have big oil imports just like we do. That is why they did the car standards.

This is a shift. When he said we are going to have carbon intensive standard, that is a major shift. And as we have seen with these 5-year plans, these things get implemented. They follow them. That is what a command and control economy is about.

And so I think we are going to see a big shift, and I am hopeful we will see that announced at Copenhagen.

Mr. PODESTA. You know, we have gone through some of the commitments they have put on the table. I think the one question you might ask is why. And I think actually there are two answers to that, or maybe three.

One is they get why creating a platform that creates greater energy efficiency creates a stronger growth model as a first matter. Second, they sense that the new industries of the future, as we suggested, all of us I think on the panel, are in these clean energy technologies. And they want to be leaders and first in those technologies, so they are putting enormous amounts of resources into them.

They want to be the leader in electric cars. They want to be the leader in high speed rail. I mean, you could go down the list, and they are making tremendous investments.

But third, and I would say this is probably of equal stature to the others, is they are very vulnerable to climate change, very vulnerable to crop loss in the north. They are engaged in very large projects to move water from the south to the north. Their coastal regions where so much of their economic development has been is highly subject to storm surge and sea level rise. The loss of the water resource in the Tibetan Plateau has enormous implications for their stability going forward.

So I think, you know, they get it. I guess it helps to have a government that is filled with engineers, but they are a bunch of engineers. And I think they get it, and they made the turn, and they are moving into this clean energy future.

Senator UDALL. Thank you. Thank you very much. Great panel. Thank you.

Senator BOXER. Thank you so much, Senator.

Senator Merkley, followed by Senator Lautenberg.

Senator MERKLEY. Thank you very much, Madam Chair.

We have been hearing in various testimony and comments different stories about Chinese strategy for the future of coal. We have heard that they are building two to three plants a week and planning to do so forever. We have heard that they are building new plants to replace older plants, and the newer plants are much more efficient. And we have heard that they are considering changing dramatically coal and its future in the Chinese energy economy.

I was wondering if you all can bring your expertise to bear and kind of give us a sense of where is China really headed on coal.

Mr. LASH. Senator Merkley, I would emphasize two points. They are, like the United States, heavily dependent on coal now, and they understand that they cannot change that in a few months or a few years. But they are taking measures to substitute much more efficient and therefore lower pollution plants for old inefficient plants at a tremendous rate.

I would repeat what I said. Their coal fleet is now more efficient than the U.S. coal fleet because they have had this high turnover. But they completely understand that they cannot go on growing on the basis of coal-fired power over the next 20 years and still meet the targets that they are setting for themselves in terms of reduced carbon intensity, ultimately having their emissions peak, and achieving no more than a 2 degree warming.

So if you work with all of their semi-official think tanks, which all of us do, they are all heavily modeling when can they peak emissions and start down; where do they have to invest; how quickly can they do it; and what can they offer the United States. They are frankly mystified that we haven't offered them anything.

Senator MERKLEY. So in terms of simple points for public dialogue, would it be accurate to say that, yes, they are building two per week, but they are replacing two per week with more efficient coal plants?

Mr. LASH. I actually think that figure is no longer true. I don't think they are building them that fast. But yes, they are building new coal-fired power plants, and most of that is now going to replacing inefficient plants because the growth in energy demand was slowed by their commitment to improve energy efficiency.

Senator MERKLEY. Have they reached a point within the coal energy economy where total carbon dioxide production has actually leveled off?

Mr. LASH. No. If they would commit to do that sometime before 2030, it would be a huge achievement. It would signal that we are really going to move forward.

Senator MERKLEY. OK. Thank you.

Mr. Podesta, I appreciate your support for the Clean Energy Deployment Administration proposed by the Energy Committee. I have proposed creating within that organization a program to provide low cost financing to do energy efficiency retrofits up front. And I was wondering if you were familiar with that, and of course the concept is folks would make the loan payments out of the value of the energy savings but would get the work done earlier, create jobs and save a lot more.

Mr. PODESTA. Senator, I would heartily endorse that idea. I think there is generally a financing problem with respect to, particularly right now, with respect to getting money flowing and moving. And I think that as we have seen with the Canadian bank, the German bank, providing some loan guarantees, some loan benefits, credit enhancement can really be effective at low cost and return money back to the Treasury by creating a revolving fund that produces this, you know, the flow of capital into clean energy in general.

But this building efficiency problem is a particularly vexing issue because generally the builder, the real part in interest, et cetera, at the front end is not the person who is paying the energy bills at the back end. And I think that the more we can build models that create the right financing mechanisms, build them in.

We put out a paper with the Energy Future Coalition that suggested both providing more financing in that sector, but also ways of essentially converting mortgage-backed instruments to capture the value of the reduced energy payments going forward. I think that would be tremendously helpful, and I think it has proved to be vexing particularly in the single family or multiple unit housing sector to get what really was promised, I think, by the recovery bill, really rocking and rolling, if you will.

Senator MERKLEY. Thank you very much.

Thank you, Madam Chair.

Mr. HELME. Can I respond?

Senator MERKLEY. I am out of time.

Senator BOXER. We need to move on.

Senator Alexander.

Senator ALEXANDER. Thanks, Madam Chairman.

Thank you all for coming.

I just had a couple of questions I wanted to think about in terms of our position in the world.

Mr. Podesta, I know you worked on this pretty hard. We have talked about it, as a matter of fact, before. Looking down the road, do you think it would be a good idea in our country as we think about trying to encourage carbon-free forms of energy, and I am not talking so much about the cap and trade, which I have expressed my—I have a different suggestion—but I am talking about the part of the bill that is likely to be added to this bill in terms of encouraging renewable energy and other forms of carbon-free energy.

Do you think it would be a good idea for that to be technology-neutral? I mean, in other words, should the production tax credit, should the renewable energy standard be a standard that includes all forms of carbon-free energy production?

Mr. PODESTA. Well, I would like to see a lot more carbon-free energy production, and I think that the question is whether there could be, I would suggest to you, Senator, that what might make sense is to add on top of the renewable electricity provisions, some additional benefits for carbon-free energy. If you are specifically talking about nuclear, I think that is probably the way to go. Maybe I answered your question.

Senator ALEXANDER. Well, yes, but——

Mr. PODESTA. I think that the targets in the bill would be insufficient if you are talking about a blended program.

Senator ALEXANDER. Why would we encourage, why would we have a subsidy, why should 75 percent of the renewable energy subsidies go to wind power?

Mr. PODESTA. Well, there is a heck of a lot of subsidies that already go to nuclear power, and I think we are talking about adding some more. And I think there are externalities. I am not, you know, Senator, I just——

Senator ALEXANDER. No, let's be specific about it. I mean the Obama administration says we want to make 20 percent of our energy from wind, the way I compute it, with a production tax credit with no cap on it, that is $170 billion over 10 years. There is a 6,000 megawatt production tax credit for nuclear. That is the way I compute it. That is $6.8 billion over 8 years.

So whether it is solar or whether it is wind or whether it is geothermal, why——

Mr. PODESTA. But there are loan guarantees, there is Price-Anderson. I think you have to do a full accounting, and I think that——

Senator ALEXANDER. In terms of loan guarantees, wouldn't it be better to say let's have $100 billion of loan guarantees for all carbon-free technologies, including wind and including solar and including geothermal? Wouldn't it better to have a production tax credit for all carbon-free technologies? I mean, why should we be picking? If I were picking, I would pick nuclear and leave wind alone. Someone else might pick wind and leave nuclear alone. But why would we exclude nuclear? It is 70 percent of our carbon-free electricity.

Mr. PODESTA. I think, Senator, if you are looking at a full cost accounting, including storage, you know, I think that you would have to look at are you providing additional benefits to those technologies. In the past, it is clear that the U.S. subsidy policy to date has favored nuclear, not these renewables.

Senator ALEXANDER. No, sir. That is absolutely wrong. The EIA has done a study on that at the request of several Senators, and wind is far and away the big winner. I mean, wind got 31 times more subsidies per kilowatt hour than all other renewable forms of energy, not including nuclear.

Let me ask one other question while we——

Mr. PODESTA. Let me put my numbers in for the record, then, Senator.

Senator ALEXANDER. OK, sure. I would love to have them, but the EIA says it is 31 times other renewables, and if you add up, all I am saying is looking forward, shouldn't the production tax credit, the renewable energy standard, all those be carbon-free standards, rather than picking and choosing winners.

Mr. PODESTA. It depends on where you want to place the number for. Of you want to take the carbon-free number up a good deal, then I think you and I might——

Senator ALEXANDER. Here is my last one, we have 30 seconds.

Mr. PODESTA. I don't know what the Chairman would do, but you and I might have something to talk about.

Senator ALEXANDER. I have 30—oh, I do. You know I do want to take it up, and number. My question is, the President said at a town hall meeting in New Orleans we would be stupid, in his words, not to use nuclear power because Japan and France are doing it. I was delighted to hear him say that. He went to the U.N. and made a speech about climate change and didn't mention it, even though China is starting a new nuclear plant every 2 or 3 years. Japan is—you know the story. France is 80 percent nuclear.

What can we do to get the Obama administration as interested in nuclear power, which produces 70 percent of our carbon-free electricity, as they are in building windmills?

Mr. PODESTA. Well, Senator, I don't speak for them. I think that you ought to talk to the President directly about that.

Senator ALEXANDER. I would be glad to. I would be glad to.

Senator BOXER. I think, Senator, if you did speak with the President, and you have spoken with Steven Chu, they are very interested. And I am going to reiterate this again, because this is an ongoing discussion.

The modeling shows that under the Kerry-Boxer bill, we will have more than 150 nuclear power plants built in this country. Under the Senator from Tennessee's plan, it is 100 plants. There are more plants being built because when you put a price on carbon, that is what happens.

In addition, I don't know why the Senator is so hostile to the bill. We are giving half a billion dollars over the life of the bill to nuclear power plant people in order to train workers, which they would have to do on their own for safety. And that number may well go up because Senator Graham is working with Senator Kerry. I wish the Senator from Tennessee would join your little group and let's talk.

Senator ALEXANDER. I have tried to say to the Senator repeatedly what my views are. I think the economy-wide cap and trade doesn't work with fuel. I think it adds costs, and I have a list of things that I think would help produce more nuclear power. We have had that discussion before.

Senator BOXER. We will, and we will continue.

Senator Lautenberg.

Senator LAUTENBERG. Thank, Madam Chairman.

And thanks to you for being here to express your views. They are critical in what we are doing. As we all know, our goal long term, 83 percent by 2050, has to be met in order for us to do what our responsibilities demand that we do. In order to get there, we have to be on a glide slope that says by 2020 that we have to be reduced by 20 percent.

And so I ask—John Podesta, good to see you. The E.U. has set even stronger emission reduction targets, as have Japan and other economies. Don't we risk falling behind other countries in the race to lead the world in clean energy technology if we don't stick with our strong short-term target?

Mr. PODESTA. Well, Senator, absolutely. I think that, again, as my testimony indicates, I think that the world is rushing ahead of us, and if we don't set the right policy framework for these new investments, we are going to be left behind. Business is going to go over there. Production is going to go over there. And they are going to service those markets.

So it is I think critical to get this bill passed, and get it passed soon.

Mr. HELME. I would agree on that point. I just want to add one thing that is very important in your bill, and that is this idea of a supplemental goal. You have the minus 20 and then you have the investment in R&D and you also have the investment in clean technology. And this is a critical piece for the international negotiations. It is a critical opportunity for developing our players, our companies making investments in these key emerging economies. So it is a brilliant piece you have in that bill, and I hope you keep it in.

Senator LAUTENBERG. And you know, involved in this is a benefit that we didn't plan for and haven't paid for, and that is America has gained respectability from its poor behavior about environment in the past. So at least now other countries believe that we mean what we say, and we are going to hold to our mark. So that is a real jump up from where we were.

The European Union invests nearly 20 percent of its climate related spending on clean energy research and development. And while we thank our Chairman for increasing funding for R&D above the levels in the House bill, I think that we are still falling behind other countries.

And will they gain a competitive advantage if we lack the commitment to invest in R&D for the next generation of energy technology? Anyone?

Mr. LASH. We earlier, Senator, all talked about the extent to which that is already happening. In country after country, those industries are developing rapidly because they are making an assumption about tomorrow's markets that we haven't yet grasped.

Senator LAUTENBERG. We saw an interesting thing in New Jersey last week. There was a groundbreaking ceremony for an Italian company that wants to build solar panels here. They are really good at it. The panels apparently, as we heard, are really high producing, very effective panels.

But they are coming to New Jersey to build the plant. That means other countries will bring their technology to us so that we can perhaps be in the race, although I— Mr. Helme, what is the single biggest thing we can do in our committee here to send a positive signal as we go into the international conference in Copenhagen?

Mr. HELME. There are two pieces of your bill that are critical. Passing your bill is No. 1. That is the most important thing.

The two things that are critical are——

Senator LAUTENBERG. Even they agree.

[Laughter.]

Mr. HELME [continuing]. The target, the minus 20, plus this supplemental piece, and the fact that the supplemental piece says we are serious about putting some money on the table to assist developing countries in this new architecture.

Those two elements are critical. That is the test of our stance in Copenhagen. Are we on the line for real reductions? And are we on the line to help others make that move?

Mr. LASH. Senator, could I add one word to that?

Senator LAUTENBERG. Sure.

Mr. LASH. It is essential that the legislation that you pass include provision for international adaptation, not for all countries, but for the poorest countries. We have ratified the framework convention on climate change which explicitly commits us to that. It is a part of the negotiations that is essential. It won't be expensive, but it is necessary.

Senator LAUTENBERG. Well, the one last thing, Mr. Lash. Both Europe and Asia have made substantial investments in passenger rail. It built sophisticated high speed networks, and perhaps you know, a thing of mine has been Amtrak and high speed rail.

Might some money, more money spent there help improve the quality and the reach of our passenger rail system, with all of the benefits that come, not the least of which is better use of energy and, of course, all of the other advantages that go with that?

Mr. LASH. As we impose limitations on carbon, the necessity of having high speed rail to replace short haul aircraft is going to be obvious. And it seems a terrible shame that we are not making that investment now, and we are rather waiting until it is an emergency later.

Senator LAUTENBERG. Thank you.

And thanks very much, Madam Chairman. Thanks.

Senator BOXER. Thank you so much, Senator Lautenberg.

Senator Specter.

Senator SPECTER. Thank you, Madam Chair.

Mr. Podesta, picking up on your statement looking for more energy sources, more carbon-free energy production, in my State that may pit natural gas versus coal. And that is one of the factors that a Pennsylvania Senator has to balance in looking at this bill.

What do you think the future of coal will be now that there has been this enormous discovery of natural gas on the Marcellus Shale?

Mr. PODESTA. Well, I think there is enormous opportunity on the natural gas side, and it is obviously about 50 percent of the CO_2 production of the use of coal. And I think switching in the short term, in the near term switching particularly the oldest coal-fired power plants over to natural gas is it would be positive step from a climate perspective. And I think there is plenty of production capacity in the United States to do that economically.

In the long term, both sources really require the investments that this bill is making in turning those sources of energy into carbon-neutral sources, but through carbon capture and sequestration.

Senator SPECTER. So you think coal can survive, flourish with the direction that this bill will take the whole energy field?

Mr. PODESTA. I think this bill gives the lifeline to coal to become an energy source in the future, not just here, but in China where there is, you know, the other places we are talking about. But we have to find a way to manage the carbon load that is coming from coal, and that requires much more investment in development of the technology, testing it, demonstrating it, creating a regulatory regime for carbon capture and sequestration. And again, I think the bill has very strong provisions in it for that.

Senator SPECTER. Mr. John Rowe this morning, on behalf of Exelon, testified that the renewables are more expensive. In the stimulus package, we have allocated some $70 billion, some estimates as high as $80 billion, to renewables, solar, wind and hydro power.

Mr. Helme, let me ask you, to what extent will that enormous investment speed up the process where the renewables will be on the market and bring the price down so that they can be competitive with other energy sources?

Mr. HELME. I think we have some good track record on that. In terms of my colleague at the end of the panel here said that he thought the German feed-in tariff had been a failure. I don't have the slide with me, but I can show you that the price of renewable wind power and so on dramatically cut, more than 50 percent cut in costs per kilowatt hour in a 10-year period with that feed-in tariff.

So I think you are exactly right. When you start building these and there is a market, they will come, and they will drive down the price.

Senator SPECTER. Do you think the 10-year period will do it?

Mr. HELME. I think the 10-year period will really help. I think it would be good to have a little more certainty beyond that, but I think it would help.

I want to go back to your question, if I can, Senator, on the gas versus coal. This new development on shale gas, it is a commercial operation where you are punching a whole series of holes. It takes a lot of workers. It has a very good economic development potential for a State like Pennsylvania in terms of jobs.

You know, we think of gas, oh, it is not much employment. In fact, the shale gas is quite a bit of employment, good jobs in the same places where the coal is. So we don't have to necessarily say it is one versus the other. This is an economic development engine, and it goes beyond the Appalachia region. It extends to Michigan. It extends to New York State, and of course for Pennsylvania. It is a very bright future and a very competitive price that could help on this jobs question.

So from an economic development perspective, a push with this carbon bill could really help Pennsylvania in terms of the net jobs over time.

Senator SPECTER. Mr. Lash, when we talk about China, reducing its emissions, the thought crosses my mind as to what impact that may have on their steel industry. That is another issue which is very important in my State, but really important nationally on an industrial base, and having steel if the necessity arises in terms of national defense.

And we have enormous problems with steel imports, and have very little relief from the International Trade Commission. The rulings have been reversed by the President under our law.

My question to you is, with China reducing its emissions, do you think there is any possibility that would lead them to cut back on their steel production to be less aggressive on subsidized and dumped steel taking jobs away from the United States in violation of the international trade laws?

Mr. LASH. May I respond briefly?

Senator BOXER. Yes.

Mr. LASH. The strongest pressure on China to reduce steel exports is the increased demand within China. They aren't producing enough for their own purposes. As they reduce CO_2 emissions, they will be forced to modernize parts of their steel industry that are still quite primitive in high emissions.

In this bill, you have included a provision that provides impact assistance to carbon-intensive industries. Steel is at the top of everyone's list. And it is not just Chinese competition. Of course, it is Indian competition as well that they are thinking of.

Mr. PODESTA. Fixing the current problem would help too, Senator.

Senator SPECTER. What?

Mr. PODESTA. I said fixing the currency problem would help as well.

Mr. HELME. And one quick point, on steel, China actually has new export tariffs to cut down the steel for exactly the reason Jonathan said. Similarly on coke, they have had significant export tariffs to discourage this, to improve their ability to meet their carbon target and other things.

So you are actually seeing some very positive moves.

Senator SPECTER. Thank you, Madam Chair.

Senator BOXER. Thank you very much, Senator Specter.

We want to thank this panel. You are all so smart and know a lot, and we appreciate it. And we would ask you to go home knowing that you really did give us a lot of information. And I am looking forward to getting that chart.

Now, there may be some questions coming to you from panelists. We would urge you, please, we need them in as soon as possible, by tomorrow close of business.

Thank you very, very much, and we look forward to getting the chart from you, Mr. Helme.

OK. We would ask our next panel to come up: Hon. Linda Adams, Dave Johnson, Stephan Dolezalek, David Hawkins, Eugene Trisko, Charlie Smith, Paul Cicio.

We are going to ask our panelists to come as quickly as they can because it has been a long day for you and for us.

So, hi, David.

Linda Adams, are you here? Where is she? Where are all our panelists? Do we know where our panelists are, Bettina? OK.

We are asking our panelists to please take their seats. We welcome you all. We are very honored at your presence. We look forward to your wisdom as we grapple with this issue.

I am going to introduce Hon. Linda Adams because we are so proud, I am so proud. She is the Secretary of the California Environmental Protection Agency, and Governor Schwarzenegger appointed Secretary Adams to this position in 2006. She oversees the California Air Resources Board, which is responsible for implementing A.B. 32, which is California's market-based climate legislation.

California EPA has undertaken a variety of studies on the impacts of climate change on our natural heritage and economy.

So it looks like all of our panelists are here.

So Ms. Adams, will you begin? And again, welcome.

STATEMENT OF HON. LINDA ADAMS, SECRETARY, CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

Ms. ADAMS. Thank you very much, Senator, for that kind introduction. I am Linda Adams, Secretary of the California Environmental Protection Agency, and I very much would like to commend this committee for considering this very critical legislation.

Combating climate change is no small task, and it will require strong political leadership. I am thankful to Chairman Boxer and Senator Kerry for their leadership in introducing the Clean Energy Jobs and American Power Act. We look forward to working with you to pass effective legislation during this Congress.

California has a long history of environmental leadership, and I believe we can provide some on the ground experiences that may be useful in the development of our Nation's energy and climate strategy.

In California, we recognize the threat of climate change to our environment and our economy. Continued global warming will harm California's health, reduce drinking water supplies, threaten our $30 billion agriculture industry, put our 1,200 miles of coastline at risk, and intensify deadly and devastating wildfires.

But we believe this challenge also presents a critical opportunity to transition our economy to one that promotes clean energy. California has experienced tremendous economic success with the implementation of cutting edge environmental and clean energy policies. Last year alone, venture capital investment in California clean technology companies was $3.3 billion, over 50 percent of all U.S. venture capital investment, creating 125,000 new jobs.

We also know first hand that the status quo is harmful to our economy. We have seen the economic consequences of our dependence on foreign oil, and a national climate policy will help us win our energy independence, grow a green economy, and combat climate change.

The demand for renewable and low carbon energy, energy efficiency technologies, and sequestration technologies is likely to create significant growth industries in the coming decade. By leading the way, we can capitalize on the $6 trillion international energy market. An aggressive long-term Federal policy on climate change is needed now, one that recognizes and builds on the important and valuable role of the States.

States are the laboratories for innovation. We are on the front line of promoting clean energy and combating climate change. For years, well crafted State policy adapted to local conditions has been the most dynamic driver of clean energy technology, and it serves as a key component of our economic development strategy.

Existing State authority to implement clean energy and climate policy must be preserved. Without State authority to address climate change, the significant advances we have already made in combating climate change would not have been possible. And it is these important advances that should be financially supported by Federal climate policy.

A significant portion of allowance value under a national cap and trade program should come back to States to be reinvested into successful homegrown clean energy programs that directly improve people's lives and State economies.

The last point I would like to make, Senator, and you and I recently shared an award by Oxfam International—I am putting on a different hat. I am an ambassador for Oxfam America's Sisters on the Planet Program. This important initiative highlights the impact of climate change on the world's most vulnerable people, especially women.

So I encourage you to adequately address the consequences of climate change for those with the least capacity to adapt to severe weather events and water scarcity.

Madam Chairman and members of the committee, now is the time for action. It is time to forge the framework for energy independence and plant the seeds for our green energy future. I urge you to vote to free the U.S. from its addiction to foreign oil, unleash American ingenuity and competitiveness, and be a leader in the 21st century global economy.

Thank you for the opportunity to speak today.

[The prepared statement of Ms. Adams follows:]

Written Statement of
Honorable Linda Adams
Secretary
California Environmental Protection Agency
on
S. 1733 "The Clean Energy Jobs and American Power Act"
before the
Committee on Environment and Public Works
U.S. Senate
October 29, 2009

Chairman Boxer and Members of the Committee,

Thank you for inviting me to testify before your committee today. California has a long history of environmental leadership. When Governor Schwarzenegger appointed me as Secretary for Environmental Protection and charged me as his chief negotiator on California's Global Warming Solutions Act of 2006, he sent a strong signal that he wanted California's leadership to extend to combating climate change. Governor Schwarzenegger has been one of the nation's strongest voices for federal climate policy. We look forward to working with you to pass effective climate change and clean energy legislation during this Congress.

I want to commend the Environment and Public Works Committee for considering this critical legislation to address the urgent threat of climate change and set the United States on a path to a sustainable clean energy future.

Combating climate change is no small task and will require strong political leadership. I am thankful to Chairman Boxer and Senator Kerry for their leadership in introducing the Clean Energy Jobs and American Power Act. I would like to discuss how my State is working to promote clean energy and combat climate change. I believe we can provide some on-the-ground experiences that may be useful in the development of our nation's energy and climate strategy.

In California we recognize the threat of climate change to our environment and our economy. Continued global warming will harm Californian's health by exacerbating air pollution, intensifying heat waves, and expanding the range of infectious diseases. Our State is largely dependent on snowpack to supply water during the spring and summer months, and we may lose up to 90 percent of that snowpack in the next 75-100 years. Our $30 billion agriculture industry, which employs more than one million workers, relies on water from the snowpack to irrigate crops and care for livestock. Our 1,200 miles of coastline are threatened by sea level rise. Forestlands cover 45 percent of our state and our scientists tell us that the risk of large wildfires could increase by 55 percent. We can expect more intense fires and a fire season that starts earlier.

Action to prevent the threat of global warming – particularly the transition to sustainable clean energy – has great potential to spur the development of new technologies and encourage more efficient production practices. California has experienced tremendous economic success with the implementation of cutting-edge environmental and clean energy policies.

We know first hand that the status quo is harmful to our economy and puts us at a disadvantage as the world begins this transition to a more sustainable low-carbon economy. We have seen the economic consequences of our dependence on foreign oil, as the price of oil whipsawed between $40 and $140 a barrel over the past two years and played a central role in our current recession.

Dependence on a single commodity under the control of unfriendly suppliers will never lead to economic security. Such security arises only when consumers have a choice. A national climate policy will help us win our energy independence, grow a green economy and combat climate change.

More than three decades ago, California launched its energy efficiency effort through the use of technically feasible and cost-effective performance standards. We faced industry resistance as we implemented new policies. For example, refrigerator makers claimed new efficiency performance standards would severely limit consumer choice and raise prices. Instead, consumer choice and amenities increased, energy consumption per unit dropped 75%, and real prices fell nearly 50%. Relative to a 1974 model, the energy savings from these standards translate to an avoided 200 billion kWh per year and have saved Californian's roughly $15 billion money. That $15 billion is reinvested back into the California economy.

As each of you and every American are aware, the nation is in the grips of the worst recession in decades. California knows this all too well – as the eighth largest economy in the world, we are feeling the effects of this global recession particularly acutely. We believe that in this economy, some of the brightest points of hope are provided by green industry sectors, where energy efficiency and clean energy technologies are flourishing.

Last year alone, venture capital investment in California clean technology companies was $3.3 billion, five times greater than the second-place state. We garnered more than 60% of the nation's clean-tech investments. And from 2002 to 2007, California led all states in patent registrations for green technologies, with a 70% increase over the previous five-year period. California generates 68% more gross state product for every unit of energy as compared to the rest of the nation. By leading the way, we can capitalize on the demand for energy efficiency technologies and new energy products that make up a fast-growing part of the $6 trillion international energy market.

There are many examples of California companies taking advantage of this enormous clean energy market. Recently, Exxon-Mobil entered into a $600-million partnership with a La Jolla, California biotech company to develop fuels from algae. Over the past 5 years, California universities have been awarded nearly $1 billion to research low-carbon fuels and renewable energy technologies. A Bay Area company recently was awarded a $450 million energy efficiency contract with an East Coast utility. And the federal government just loaned more than $500 million to Irvine, California-based Fisker Automotive to rehabilitate a GM auto plant to build electric cars.

These are just some of the benefits that accrue when a State pursues cutting edge environmental policy and is friendly to innovative clean technology businesses. This kind of dramatic economic opportunity awaits every state as we transition to a clean energy economy. The consulting firm, McKinsey and Company, estimates that Americans can earn a direct return of $1.2 trillion on an investment of $520 billion in energy efficient buildings, and businesses, over the next 10 years. The money that is invested in energy efficiency multiplies throughout the economy, growing the GDP. Each dollar saved for an American because of energy efficiency is a dollar most often spent on goods and services within the United States.

The demand for renewable and low-carbon energy, energy efficiency technologies, and sequestration technologies is likely to create significant growth industries in the coming decade. The United States is already lagging behind other countries in the early stages of developing these industries. The country that invented the solar panel almost ceded the design and manufacture of technology to the Germans, the Japanese, and the Chinese. Stalwart American companies, valiant efforts in State policies, and recent investments preserve great hope for U.S. renewable industry, but industry and independent observers agree that it is critical that the federal government abandon its ad-hoc boom-and-bust energy policies and embrace stable long-term policy.

California and other leadership states have demonstrated that there is an essential role of states in a federal energy and climate policy. States are the laboratories for innovation. We are often able to go further than the national government at great benefit to our economies. California welcomes the opportunity to have a voice in this national debate.

The proposed Kerry-Boxer legislation contains many of the elements that we have embraced in California and that we have found are essential to a successful clean energy climate strategy. I would like to discuss the specifics:

Ambitious greenhouse gas targets including a cap-and-trade program: California joins the international community in calling for decisive action from the United States. Our country has contributed an overwhelming share of climate change emissions that threatens us today. I support the emission reduction goals spelled out in the Kerry-Boxer legislation. These goals are consistent with where science tells us we will need to be to avoid catastrophic climate change.

Climate change is a complex, global problem. An economy-wide cap-and-trade program is a key component to ensuring the United States meets its overall reduction targets while providing businesses individual flexibility to explore creative and cost-effective ways to reduce emissions. A cap-and-trade program that can link with other cap-and-trade programs throughout the world, will provide greater emission reductions and lower costs.

Mix of measures: Combating climate change will require a mix of market-based and standards-based polices that complement one another. Clean energy policies such as energy efficiency standards, a low-carbon fuels standard, and greenhouse gas standards for vehicles, are complementary to cap-and-trade. Such policies help to overcome market barriers, accelerate low-carbon and sustainable technologies, and minimize cost impacts.

The Kerry-Boxer legislation embraces this mixed approach. By investing in technologies like renewable energy, carbon capture and storage, and advanced low-carbon fuels and vehicles, the Kerry-Boxer legislation hastens the day when low-carbon energy is as cheap as the fossil fuel supply of today. The Kerry-Boxer legislation's programs to increase building efficiency standards will save money for consumers and businesses across the country.

Traditional environmental law backstop. The Clean Air Act is a complementary regulatory structure to the comprehensive program outlined in the Kerry-Boxer legislation. With a few simple changes, this hugely successful and adaptable bedrock of American environmental policy can successfully be applied to greenhouse gases. The Clean Air Act should retain its authority to address major new sources of emissions as a critical component of a comprehensive system. Major greenhouse gas emission sources often entail long-term capital investments, and building new plants with old technology can "lock-in" high emissions for decades to come. It is important that the U.S. EPA be empowered to review the technology proposed for new major pollution sources to ensure its long term cost effectiveness for consumers.

Reporting: California is a founding member of The Climate Registry, one of 41states, 13 Canadian provinces and 6 states in Mexico that have joined together to create an effective and efficient system to measure and report greenhouse gas emissions. I appreciate that the Kerry-Boxer legislation specifically calls out The Climate Registry and requires that U.S. EPA build on our model. I believe the legislation should also mandate, as is required of members of The Climate Registry and by California's mandatory reporting program, that companies' greenhouse gas reporting be verified by neutral third-parties. Third party verification conforms with emerging international standards for reporting systems that support cap and trade programs. In analogy to third party audits of financial reports, it leads to more accuracy in reporting. In contrast with other pollutants monitoring systems, there will a large number of diverse sources reporting GHG emissions, which will make direct verification by a government entity burdensome and difficult.

The Role of the States. States are on the front lines of promoting clean energy and combating climate change. For years, well-crafted state policy, adapted to local conditions has been the most dynamic driver of clean energy technology as a key component of our economic development strategy – from biofuel standards to renewable electricity standards; from E85 in Minnesota to the wind turbines of West Texas. In California, we are committed to programs including 33% renewable electricity generation, a 10% reduction in greenhouse gas emissions from transportation fuels, and preserving the carbon sequestration potential of our state forests and agricultural lands. California and other states have taken the initiative to become leaders in combating climate change and transitioning to a sustainable low-carbon economy. Without state authority to address climate change, we would not have made the significant advances we have made in combating climate change including: greenhouse gas vehicle emission standards that were recently adopted by the Obama administration; energy efficiency standards that have saved our citizens money and driven technological innovation; and a low-carbon fuel standard is a model for other states and the international community. State authority to implement clean energy and climate policy must not be abridged.

Transportation. I would like to call specific attention to the Kerry-Boxer legislation's comprehensive approach to transportation. Transportation accounts for more than 30% of national greenhouse gas emissions. California has vast experience with reducing emissions from the transportation sector. We advocate a multi-pronged strategy to address the transportation sector, reducing emissions associated with vehicles, fuels, and increasing transportation demand, and we applaud the Kerry-Boxer legislation for following this path.

The groundbreaking Section 112/831, transportation efficiency provisions, build upon California's SB 375 program to help local communities make planning decisions that can simultaneously address transportation, housing, economic development, and environmental outcomes.

State and local investment. I appreciate the difficulties associated with returning the value generated by allowances to the economy in the most efficient and equitable way. As Governor Schwarzenegger has highlighted several times, we support three basic ways to use emission allowance value: mitigation of costs to consumers and business, investment in low-carbon technologies and efficiency, and preparation for the unavoidable impacts of climate change. I am glad to say that the Kerry-Boxer legislation largely embraces these principles. States are on the forefront of implementing the policies needed to ensure the success of these principles in the Kerry-Boxer legislation.

In California, we have assembled some of the world's preeminent economists, business leaders, and climate experts to advise our Air Resources Board on the allocation of emission allowance value. While the conclusions of the Economic and Allocation Advisory Committee are not yet available, we hope to continue to work with you and provide input based on the advice of our expert advisory committee.

Incentivizing clean energy and efficiency. I appreciate the fact that the Kerry-Boxer legislation, like the Waxman-Markey legislation, abides by the compromise formula for allocation to Local Distribution Companies agreed to by a wide variety of industry and stakeholder groups. The balanced emissions and sales formula is fair to every region of the country as it strikes a careful balance between mitigating consumers' costs today and incentivizing the clean technologies of tomorrow. Californians have historically invested in clean energy and energy efficiency, resulting in reduced household costs for energy despite relatively high per-unit electricity prices. Our ratepayers should not be penalized by an emissions-based system that rewards dirtier, cheaper energy.

Offset integrity. Offsets that are real, measurable, additional, verifiable, permanent, and enforceable offer an opportunity to reduce the overall costs of achieving our climate goals while realizing cost-effective reductions from sources not covered by the cap and trade program. In California, we have been ardent supporters of land-based offsets from farms and forests to provide real greenhouse gas benefits while at the same time reinvigorating rural communities.

California has been on the leading edge of ensuring the credibility of offsets, working closely with the Climate Action Reserve to establish stringent offset protocols. We recognize that impeccable offset integrity is a cornerstone prerequisite of any successful offset program. Substandard offsets have the potential to undermine the entire market, coloring all participants with the same brush, and ultimately making the system unusable for its intended purpose and of little value to sellers and buyers alike. We support the strengthened offset process outlined in the Kerry-Boxer legislation, and call for even firmer definition to the criteria of additionality, as well as greater oversight power for the offset integrity board.

International cooperation. I appreciate the Kerry-Boxer legislation's emphasis on engaging solutions from the international community. The Reduced Deforestation and Clean Technology Transfer provisions are particularly welcome as they build the capacity in developing nations. In particular, they will ensure that developing nations preserve the immense standing stores of carbon in forests and rely on the sustainable technology already available in developed nations. Additional support is necessary for adaptation assistance to ensure that the unavoidable impacts of climate change do not lead to destabilization of foreign governments and societies, and do not cause massive moral and national security crises for our country.

Adaptation. The federal government must be responsible for and must invest in the basic science and applications that will accurately assess the impacts of climate change. These impacts are, by their nature, regionally and geographically distinct. Additionally, it must develop and disseminate the decision tools that State and local jurisdictions require to adequately plan and prepare these impacts. The federal government can also assist State and local government with resources to protect and buttress critical infrastructure, promote ecological resilience, and address public health threats. Scientific and analytical support for local and regional impact studies should be front-loaded to provide a strong foundation for future policy decisions. Additional material aid to State and local governments should be significant in magnitude, consistent in its availability, and dynamic enough to respond to evolving threats.

In California, our current 3 year of drought is a precursor for the impacts that we may expect in the future. Water is the lifeblood of our economy, and we must begin planning and preparing now for a world with reduced water availability. The Kerry-Boxer legislation's specific provisions for activities to increase adaptation and resilience to changes in water availability are, therefore, particularly welcome.

Lastly, I have the honor to serve as an ambassador for Oxfam America's Sisters on the Planet program, which highlights the impact of climate change on the world's most vulnerable people - especially women. I encourage you to adequately address in this bill the consequences of climate change for those with the least capacity to adapt to severe weather events and water scarcity. Resources to help women and other vulnerable communities build their resilience must be an integral part of our climate solution.

Madame Chairman, members of the Committee, now is the time for action. It is time to forge the framework for energy independence and plant the seeds for our green energy future. In 2005, Governor Schwarzenegger set California on a path toward more renewable energy, cleaner cars on the road, and more efficient appliances and buildings. A similar choice faces the United States and this body now. I urge you to vote to free the U.S. from its addiction to foreign oil, unleash American ingenuity and be a leader in the 21st century global economy. Choosing this course will require courage and leadership to be sure, but I believe, the people of California believe, and a majority of this nation believes, it is the only responsible choice you can make.

Questions from Senator Boxer

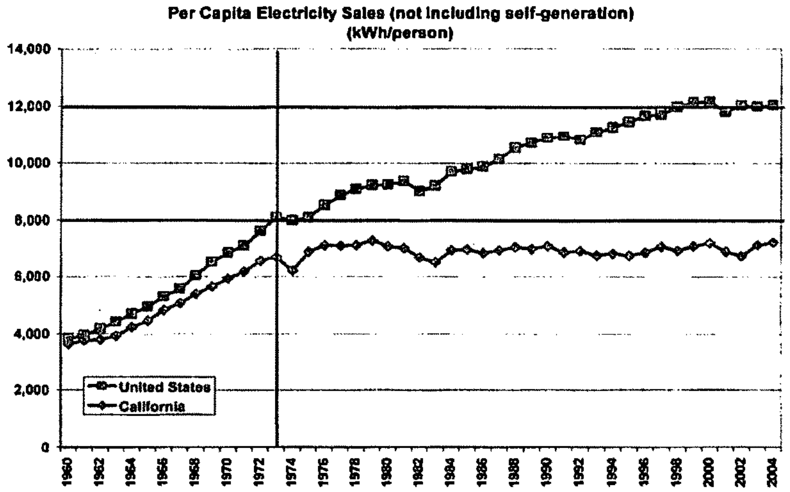
Q: What has been the experience in the State of CA in implementing 30 years of energy efficiency policy?

A: California has achieved tremendous energy efficiency savings by requiring and providing incentives for energy efficiency, resulting in billions of dollars in avoided costs that are returned and recycled to grow the state's economy. We are now building on this success by making energy efficiency our bedrock strategy to meet the challenge of reducing California's greenhouse gases 80% below 1990 levels by 2050.

The state's energy efficiency achievement to date can be seen in Figure 1, which compares per capita electricity use in California and in the United States as a whole. Since 1973, US per capita electricity use grew 50 percent, or about 2 percent per year. Meanwhile, California's per capita electricity use has stayed flat.

But California cannot rest, because the state's greenhouse gas emissions goals for 2020 and 2050 mean that efforts for energy efficiency must be redoubled with innovative new programs and mandates. These new efforts must cause absolute levels of electricity and fuel usage to diminish each year, rather than increase, even as the population and economy grows.

How did California accomplish its success to date? In 1976, after the first energy crisis, the California Energy Commission established the first U.S. appliance efficiency regulations, followed in 1978 by the nation's first mandatory building efficiency requirements. Building standards alone have produced estimated savings of $56 billion in electricity and natural gas costs since 1978, and will save another $23 billion in cost savings by 2013.


Per Capita Electricity Sales (not including self-generation) (kWh/person)

In addition to California's efficiency standards, California utilities, under the direction of the California Public Utilities Commission, have been carrying out trendsetting energy efficiency programs since 1980. A key ingredient to the policy has been the decision to partially decouple utility profits from a need to continually increase electricity and natural gas sales. Instead, investor-owned utilities were allowed to make profits on energy efficiency programs comparable to earnings generated by increased sales and the building of new power plants. In addition, California's publicly-owned utilities have also been leaders in innovative, effective, energy efficiency programs.

Now California's commitment to energy efficiency and environmental responsibility faces a new challenge. In order to meet the state's aggressive greenhouse gas emissions reduction goals, much higher levels of energy conservation and energy efficiency are required. Keeping energy consumption per capita flat can no longer meet state needs. To meet the 2020 goal of reducing emissions to1990 levels, and to begin the trajectory toward an 80 percent reduction in greenhouse gas emissions by 2050, great strides to achieve much deeper energy efficiency throughout the electricity system are critical. Absolute levels of energy consumption must begin to decline, instead of increasing at one to 1.5 percent per year along with population growth.

California is stepping up to the challenge. We have set the goal that by 2020, all new homes must be "zero net energy" homes, and commercial buildings should be "zero net energy" by 2030. This means efficient new buildings in the next decades will use well under half the energy of current buildings, and remaining electricity needs will be met with onsite or neighborhood renewable generation. Other important steps currently being planned and piloted include targeting 40 percent reductions in energy use in existing homes, greatly increasing the "cogeneration" of heat and electricity, and continuing to grow the solar market. A combination of new legislative and regulatory mandates along with market initiatives and incentives are currently being developed.

The Global Warming Solutions Act Scoping Plan for achieving California's climate change protection goals identified energy efficiency as a key measure to reduce greenhouse gas emissions. To date, energy efficiency has been achieved at a negative economic cost. Besides its direct economic benefits, energy efficiency also means that the need for other emissions reduction measures like large scale renewable power is reduced, lowering their costs as well. With its economic and strategic benefits, energy efficiency is an important cornerstone of California's path to a strong economy in a low-carbon world.

Q: California has extensive experience in designing voluntary offset protocols, can you describe your experience in ensuring offset quality?

A: California has taken a careful and deliberate approach to voluntary offset development, ensuring that the offset protocols we approve achieve stringent standards of additionality, permanence, and enforceability. We recognize that ensuring the quality of offset projects is critical to guaranteeing the credibility of our entire offset program. And maintaining the credibility of the offset program – especially if and when such a program is linked to a mandatory greenhouse gas cap-and-trade program – is absolutely essential to both achieving the environmental objectives of real emissions reductions and to preserving the value of offset products to project developers, offset buyers, and all market participants. We are convinced that maintaining credibility through a rigorous offset protocol, verification process, and enforcement is in everyone's interest.

The California Air Resources Board, California's lead agency for implementing the Global Warming Solutions Act of 2006, has approved a series of offset protocols for developing voluntary greenhouse gas offsets. These voluntary offset protocols have provided the state with invaluable expertise in the development of an offset program. We expect and hope that the work we have done on ensuring offset quality will form the foundation for regulatory-grade offset standards in the future.

In developing its offset protocols, California has worked closely with the Climate Action Reserve. The Climate Action Reserve is a nonprofit outgrowth of the California Climate Action Registry, a non-profit entity legislatively established by the State of California to lay the groundwork for reducing greenhouse gases by developing protocols for measuring and reporting these emissions. The Climate Action Reserve continues this mission today by creating protocols for measuring, verifying, and tracking greenhouse gas emission offsets. California agency staff participates in Climate Action Registry workgroups, and CalEPA Secretary Linda Adams serves as Chairman of the Board.

The Climate Action Reserve has created an exemplary program for developing offset protocols. Part of the success of the Climate Action Reserve's program is its focus on the critical elements of offset quality: rigorous and transparent quantification protocols, assiduous training and oversight of independent verifiers, and a strong registration and tracking system to ensure and enforce ownership and prevent double counting. To avoid real or perceived conflicts of interest, the program does not engage in financial transactions for offset credits, nor does it fund, solicit, or otherwise develop emission reduction projects, and it does not serve as a trading platform or exchange for offset credits.

The program's offset protocols rely on stakeholder-developed, standardized, performance-based standards that reduce subjectivity and uncertainty while upholding environmental integrity. These protocols help assure that offsets meet the key tests of being *real, permanent, and additional.* CAR's verification program requires that verifiers demonstrate competence in each specific project type and we employ conflict of interest assessments and mitigation requirements, random verifier audits, and strict performance evaluations to ensure that verification activities are conducted accurately and properly. Finally, the program's underlying registry system provides a strong enforcement ability by including mechanisms to prevent double counting, impose public disclosure requirements, and ensure ownership.

The Climate Action Reserve relies on four key principles in its program and these should guide any future federal effort. These are: accuracy, conservativeness, transparency, and practicality. *Accuracy* is necessary to ensure that measurement and estimation techniques, and emission factors reflect best available science. *Conservativeness* is applied when there is some uncertainty with regard to the quantification of emission reductions to ensure that such reductions are not overestimated. *Transparency* ensures that outside observers have unhindered access to all aspects of the program so that they may gauge for themselves its accuracy and credibility. Finally, notwithstanding other guiding principles, for a program to function effectively, it must not simply be an academic exercise but it must instead incorporate a common-sense approach and be *practical* so that it can be used to encourage and create emission reductions.

To date, the Climate Action Reserve has adopted standardized, performance-based protocols for use throughout the U.S. in the areas of: forestry, urban forestry, landfill gas, livestock waste management, organic waste diversion, and coal mine methane. There are now more than 100 projects in 36 U.S. states that are participating in our program using these standards. CAR is currently developing additional protocols in the areas of nitric acid production, ozone depleting substances, composting, and we will soon begin work on agriculture and soils, transportation, and other project areas.

California's experience in developing and approving greenhouse gas offset protocols has shown that it is possible to design and implement an effective, credible, and practical offsets program – if there is sufficient up-front investment in a rigorous, transparent process, guided by the best science, to develop robust protocols that will maintain credibility in the long-term.

Senator BOXER. Thank you so much. You speak for me with your statement.

Next, we hear from Dave Johnson, Organizing Director, Laborers' Union Eastern Region, Laborers' International Union of North America, a 12-year member. And Mr. Johnson is responsible for coordinating and overseeing organizing activity for the five boroughs of New York City, Long Island, New Jersey, and Delaware.

It is a union of construction workers and public service employees, and we are very pleased you are here.

STATEMENT OF DAVE JOHNSON, ORGANIZING DIRECTOR, LABORERS' UNION EASTERN REGION, LABORERS' INTERNATIONAL UNION OF NORTH AMERICA

Mr. JOHNSON. Thank you, Chairwoman Boxer and members of the Environment and Public Works Committee. Thank you for having me here today.

My name is Dave Johnson, and I am the Eastern Region Organizing Director for the Laborers' International Union of North America, LIUNA for short. LIUNA is a proud union of 500,000 construction workers who do the hard work of building America's infrastructure. I have had the pleasure of working with Laborers' Local 10 and 55, Locals set up for our members who weatherize homes in New York City, Long Island, New Jersey and Delaware.

LIUNA supports the extraordinary work being done by both Chairwoman Boxer and Senator Kerry and this committee and by the Energy and Natural Resources Committee. We support cap and trade as an effective way to force reductions in greenhouse gas emissions. A strong climate change bill will also put millions of Americans back to work.

Since 2003, LIUNA has been working with contractors in 17 States to help build wind farms. In addition, LIUNA members are prepared to expand the building of solar farms and to help modernize our inefficient and outdated electrical grid. The Laborers' also call on Congress to invest in new technologies such as carbon capture and sequestration techniques, natural gas technologies, and the use of nuclear power as a necessary way to meet carbon emission reductions.

I would like to take a moment to tell the members of this committee about the Laborers' success in working with community groups, community action programs, State governments, and our union's training fund to put Laborers' into weatherizing homes. When the Obama administration made weatherization a priority by injecting stimulus money into its Weatherization Assistance Program, Laborers' Local 55 in Newark was already working with the Garden State Alliance for a New Economy to provide weatherization training for unemployed Local residents.

In January 2009, a crew of 22 LIUNA members performed energy audits, sealed air leaks with caulking, applied weather stripping around doors, wrapped pipes and hot water heaters, and installed fiberglass insulation in 30 homes to demonstrate the program's potential to create jobs and deliver energy savings to homeowners. Three months later, 23 Newark residents graduated from LIUNA's Pilot Training Program.

Since then, the Newark model has caught fire in our region. State officials in Delaware and New Jersey have established new weatherization training standards and career pipelines and have asked LIUNA to help contractors meet the new requirements. The largest provider in New York City, Community Environmental Center, has signed with LIUNA to train and represent its weatherization work force.

Nearly 80 low income community residents in New Jersey have been trained as LIUNA installers, and hundreds more have come to informational meetings seeking to participate in the program. We will be able to deliver.

Our training center recently won a bid to train 600 workers for the New Jersey Department of Labor over 18 months, and the State hopes to place 90 percent of the trainees in jobs. Demand for the program is high because all LIUNA weatherization workers earn family supporting wages and receive employer-paid family health care.

Building on its success in the eastern region, LIUNA has launched a breakthrough nationwide program. LIUNA's more than 70 training centers around the country are equipped to provide local unemployed workers with training as well as access to a network of future employment connections.

Outside the eastern region, programs have been launched in Colorado, Mississippi, Nevada, Oregon, Washington State and the District of Columbia, with many more coming online soon. Our goal is to train and represent at least 50,000 weatherization workers nationwide within 5 years, increasing production by nearly a million homes a year.

LIUNA has also developed a market building approach. Along with the Sierra Club and entrepreneurs from the Clean Economy Network, LIUNA and the Change To Win Labor Federation have sponsored a national retrofit road show that is bringing together local and State stakeholders.

Finally, as part of our commitment to support the emerging industry, LIUNA supports the development of national standards for all residential energy efficiency programs. Such standards are in line with the recently released Recovery Through Retrofit White House report that identifies a skilled and certified work force as one of three barriers to a successful national energy efficiency ramp-up.

LIUNA applauds your bill, the Clean Energy Jobs and American Power Act, as a strong step forward in this legislative process. LIUNA, along with our partners in the environmental community, want to help Congress and the Administration put America on a path to preserve a livable climate and create a clean energy economy.

Thank you for the opportunity to testify before this committee.

[The prepared statement of Mr. Johnson follows:]

Dave Johnson
Organizing Director, Laborers' Union Eastern Region
Laborers' International Union of North America (LIUNA)
Remarks to U.S. Senate
Committee on Environment and Public Works
Thursday, October 29, 2009

Introduction

Good Morning Chairwoman Boxer and Members of the Environment and Public Works Committee. Thank you for having me here today to speak on behalf of the Laborers' International Union of North America (LIUNA) about green jobs and the potential for putting people to work weatherizing homes. LIUNA is a proud union of 500,000 construction workers who do the hard work of building America's infrastructure. Our members have traditionally built roads, bridges, airports, railways, subways, schools, power plants, and pipelines including oil and natural gas lines in the Northwest. In the past decade, our work has expanded to include construction of wind turbines, solar fields, and biofuel plants.

My name is Dave Johnson and I am the Organizing Director for LIUNA's Eastern Region. I have had the pleasure of working with Laborers' Locals 10 and 55, locals set up for our members who weatherize homes in New York City, Long Island, New Jersey, and Delaware. In the past three months our region's training funds graduated nearly 50 new union members who are ready to do skilled weatherization work in Delaware and New York alone.

A Clean Energy Economy Benefits Our Members

LIUNA supports the extraordinary work being done both by Chairwoman Boxer and Senator Kerry and this Committee, and by the Energy and Natural Resources Committee. We support cap and trade as an effective way to force reductions in greenhouse gas emissions. A strong climate change bill will not only dramatically reduce carbon emissions, but also put millions of Americans back to work on the installation of wind and solar power generation capacity; the modernization of our electrical grid and transportation systems; and the retrofitting of tens of millions of energy-inefficient buildings.

LIUNA is proud to be working in partnership with business, community, and environmental organizations. LIUNA and its partners share a vision and commitment to ensuring that good quality jobs are created as our government transitions to a clean energy economy that will benefit our members, our children and our communities. Our partners include the Sierra Club, the Blue Green Alliance, the Clean Economy Network, Green for All, and the Apollo Alliance among others.

LIUNA is a Stakeholder in Clean Energy Industries

Since 2003, LIUNA has been working with contractors in 17 states to help build wind farms. In addition, LIUNA members are prepared to expand the building of solar farms and to help modernize our inefficient and outdated electrical grid. According to the Center for American Progress, $1 billion invested in these clean energy projects could create 20,000 jobs over 2 years.[i]

While we look ahead to the expansion of wind, solar and biofuels, the Laborers also call on Congress to ease the transition for our traditional energy sources by investing in new technologies. LIUNA members see the job potential not only in weatherization and energy efficiency industries but also in wide scale use of carbon capture sequestration techniques, advances in natural gas technologies and the use of nuclear power as a necessary way to meet carbon emissions reductions.

LIUNA's Role in the Weatherization Recovery Ramp-Up

I'd like to take a moment to tell the members of this Committee about the Laborers successes in working with community action programs, state governments and our union's training fund to put Laborers into jobs weatherizing homes.

Weatherizing homes, which account for 22 percent of America's energy consumption,[ii] can reduce our dependence on foreign oil and create hundreds of thousands of family-supporting jobs. LIUNA trains workers in weatherization that substantially reduces a building's energy use, putting people back to work in their communities and equipping them with skills for the future. Every million homes weatherized supports 78,000 jobs[iii] and the U.S. Department of Energy estimates a $2.73 return in benefits for each $1 invested in weatherization.[iv]

When the Obama Administration made weatherization a priority by injecting stimulus money into its Weatherization Assistance Program earlier this year, Laborer's Local 55 in Newark was already working with the Garden State Alliance for a New Economy to provide weatherization training for unemployed, local residents in Newark, New Jersey. Both organizations were committed to ensuring that green jobs were also good jobs that paid family supporting wages, provided health benefits, and provided career opportunities.

In January 2009, a crew of 22 LIUNA members performed energy audits, sealed air leaks with caulking, applied weather stripping around doors, wrapped pipes and hot water heaters and installed fiberglass insulation in 30 Newark homes to demonstrate the program's potential to create jobs and deliver energy savings to homeowners. Three months later, twenty three Newark residents graduated from LIUNA's pilot weatherization training program.

Since then, the "Newark model" has caught fire in our region. State officials in Delaware and New Jersey have established new weatherization training standards and career pipelines, and have asked LIUNA to help contractors meet the new requirements. The largest provider in New York City, Community Environmental Center, has signed with LIUNA to train and represent its weatherization workforce. Nearly 80 low-income community residents in New Jersey have been trained as LIUNA installers and hundreds more have come to informational meetings seeking to participate in the program. We'll be able to deliver. Our training center recently won a bid to train 600 workers for the NJ Department of Labor over 18 months. The state hopes to place 90% of the trainees in jobs. Demand for the program is high because all LIUNA weatherization workers earn family-supporting wages and receive employer-paid family health coverage.

Building on its success in the Eastern Region, LIUNA has launched a breakthrough, nationwide program to train new workers in residential construction and weatherization work. LIUNA's 70+ training centers around the country are equipped to provide local, unemployed workers with training as Technician/Installers, Weatherization Supervisors and Energy Auditors, as well as access to a network of future employment connections. Outside the Eastern Region, training programs have been launched in Denver, Colorado; Jackson, Mississippi; Las Vegas, Nevada; Portland, Oregon; Seattle; Washington; and the District of Columbia, with many more coming online soon. LIUNA will also be promoting DOE's national weatherization day this week and next in Washington State, Rhode Island and Mississippi.

Commitment to Growing a High-Quality Residential Energy Efficiency Industry

LIUNA has also developed a market-building approach that brings together state and local government, industry, labor, and community groups to build awareness, capacity, and ultimately robust demand for residential energy efficiency services. Along with entrepreneurs from the Clean Economy Network and Sierra Club, LIUNA and the Change to Win labor federation have sponsored a national "retrofit roadshow" that is bringing together local and state stakeholders to take residential efficiency programs to scale in states like Colorado, Ohio, and Maine.

We believe these programs will contribute to upgrading millions of poorly insulated homes and help put more money back into people's pockets instead of paying utility companies for wasted energy. Our goal is to train and represent at least 50,000 weatherization workers nationwide within five years – increasing production capacity by nearly a million homes a year. This new capacity will be critically important if we are to make effective use of the residential efficiency programs and funding streams created by the Senate climate and energy bills.

Combined with LIUNA's commitment to training residents of low-income communities, these training programs help to rebuild America's middle class and economy.

As a part of our commitment to support the emerging energy efficiency industry, LIUNA also supports the development of national standards for all residential energy efficiency programs. Such standards are in line with the recently released *Recovery through Retrofit* White House report that identifies a skilled and certified workforce as one of three barriers to a successful national energy efficiency ramp-up. The standards would help to ensure the quality and efficacy of the work, protect homeowners, build confidence, and maximize the return on public investments through the qualification of residential efficiency contractors.

A Strong Climate Bill Can Mean Quality Jobs for America's Workers

LIUNA applauds your bill, S. 1733, the Clean Energy Jobs and American Power Act, as a strong step forward in this legislative process. Particularly, LIUNA is pleased to see incentives for deployment of Carbon Capture Sequestration, and the inclusion of the Retrofits for Energy and Environmental Performance (REEP) program, the Green Construction Careers Demonstration Project, and emphasis on water and building retrofits. We also applaud the inclusion of grants for renewable energy deployment in the states and for research and development in advanced natural gas technologies.

A strong worker training component is critical to a successful climate change bill. The Committee's inclusion of the Green Jobs Act is a big help to get unemployed workers into green jobs. The Laborers have invested heavily in developing the curriculum and the training instructor pool necessary to bring workers into future weatherization jobs. LIUNA would also urge the Committee to take steps to make sure that training and job opportunities are open for residents of low income communities.

LIUNA asks the Committee to continue the work of the House, having passed the American Clean Energy and Security Act, and report out a bill that will invest federal resources in the creation of green jobs that come with prevailing wages, quality skills training and career pathways. We urge the Committee to ensure that provisions are included that direct public investment in programs that will advance the goals of zero and low carbon energy generation while creating quality jobs.

LIUNA, along with our partners in the environmental community, want to help Congress and the Administration put America on a path to preserve a livable climate and create a clean energy economy. Thank you for the opportunity to testify before this Committee today, LIUNA looks forward to working with you all to pass legislation that will provide a road map of federal policy to move our country toward building a sustainable clean energy economy that works for all Americans.

Thank you.

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[i] Pollin, Robert, Heidi Garrett-Peltier, James Heintz, and Helen Schaber. *Green Recovery: A Program to Create Good Jobs and Start Building a Low-Carbon Economy*. Center for American Progress and Political Economy Research Institute, University of Massachusetts, September 2008. http://www.americanprogress.org/issues/2008/09/pdf/green_recovery.pdf

[ii] Energy Information Administration. Annual Energy Outlook 2009. http://www.eia.doe.gov/oiaf/aeo/pdf /0383(2009).pdf.

[iii] Wald, Matthew L. "Focus on Weatherization is Shift on Energy Cost." *The New York Times*. December 29, 2008.

[iv] Weatherization Assistance Program. "2009 Recovery Act — Frequently Asked Questions about Weatherization." http://apps1.eere.energy.gov/weatherization/recovery_act_faqs.cfm. August 2009.

Environment and Public Works Committee Hearing
October 29, 2009
Follow-Up Questions for Written Submission

Questions for Dave Johnson

Question from:

Senator Bernard Sanders

1. **Do you support including a cost-effective, flexible energy efficiency investment requirement for the electric utility allocation, similar to what was required for the natural gas allocation?**

   LIUNA along with other labor, business, community-based, consumer, and environmental organizations supports the inclusion of provisions in the bill that would require an investment in energy efficiency equivalent to at least 1/3 of the value of the total allowance allocation given to electric utilities; which is similar to the efficiency investment requirement in S.1733 for natural gas utilities.

   We see this as a tremendous revenue generator that will provide the necessary investment to grow the emerging energy efficiency industry; create hundreds of thousands of jobs and benefit consumers by lowering electricity costs. Additionally it will help decrease greenhouse gas emissions which will have the derivative effect of reducing the market price of carbon.

Question from:

Senator George V. Voinovich

2. **Mr. Johnson – I want to read you a statement from the Laborers International Great Lakes Regional Office: "Let's not kid ourselves about the need for the availability of oil. The resource is abundant in North America and provides gasoline, jet fuel, plastics, asphalt, paint, agricultural chemicals and many other products. And the most important benefit from American petroleum production is jobs." Do you agree with that statement? Also, in front of this committee yesterday, Bill Klesse of Valero Energy Corporation testified that this bill will cost the refining sector thousands of jobs and his company alone billions of dollars. What do you think about his statement?**

PART I:

I agree with the premise of the statement from LIUNA's Great Lakes Regional Office; which highlights the abundance of domestic oil and its by-product significance. Actually, I would expand the statement further to include natural gas. Also, I agree that the American Petroleum and Natural Gas industries support a broad spectrum of jobs; including construction / maintenance and permanent jobs in the upstream and downstream sectors, such as exploration and production, transportation, pipelines and refineries – all of which we want to protect so that the job opportunities are available for current and future generations of working Americans. Additionally, I would add that LIUNA has a history of working in the Oil and Gas industries; millions of man hours have been logged by Laborers in the United States and the Oil Sands Region of Alberta Canada.

I am glad that you highlighted this statement because it gives me the opportunity to better explain LIUNA's belief that traditional domestic energy production should not be displaced as we identify policies to rationally address climate change. We should not be picking winners and losers; instead, federal policies should include provisions that make the necessary investments in technology to generate energy from traditional as well as alternative / renewable sources in a cleaner more environmentally friendly manner while at the same time making the necessary investments to enhance energy efficiency. It is LIUNA's belief that the answer to our Nation's future energy production and the need to move toward a clean energy economy is a combination of all of the above.

PART II:

It can be derived from my submitted testimony and from my answers so far, that jobs and traditional domestic energy production sectors are very important to LIUNA. Therefore, I take it very seriously when I hear a representative of an industry, like Mr. Kleese of Valero Energy Corporation; indicate that S. 1733 would cost the refining sector thousands of jobs and his company billions of dollars. However, I agree with the Chair of the Committee, Senator Boxer, when she referenced that the bill includes provisions to cushion the effects on refiners. As I understand it, S. 1733 provides 2.25 percent of the free emissions allowances to the refining sector. I trust that the Committee will work with the refining industry to make sure that all global competitive barriers are considered and the necessary offsets are in place to prevent the massive costs and job losses in the refining sector.

Senator BOXER. Thank you so much.

And I want to make sure that our next guest gets his name pronounced correctly. Is it Dolezalek? You tell me.

Mr. DOLEZALEK. Dolezalek.

Senator BOXER. Dolezalek. Stephan Dolezalek, Managing Director of VantagePoint Venture Partners. And you are from my home State, is that correct?

Mr. DOLEZALEK. That is correct.

Senator BOXER. We are very proud of that. He joined the firm in 1999, and he served as head of co-head of the firm's Software and Life Sciences Group. Prior to creating the firm's clean tech platform in 2002, he spent 23 years in Silicon Valley working with technology driven companies. And VantagePoint has established a leading practice to meet the large and rapidly growing opportunities in clean technology.

So welcome, sir.

Mr. DOLEZALEK. Thank you.

STATEMENT OF J. STEPHAN DOLEZALEK, MANAGING DIRECTOR, VANTAGEPOINT VENTURE PARTNERS

Mr. DOLEZALEK. Chairwoman Boxer, Ranking Member Inhofe and members of the committee, I am Stephan Dolezalek, Managing Director and CleanTech Group Leader at VantagePoint Venture Partners. Thank you for the opportunity to be with you to share my perspective on the need for action on this very important topic.

Today, VantagePoint has the largest clean energy position in the venture capital industry with just over $1 billion committed. We are the largest stockholder in leading companies in the solar, vehicle electrification, biofuels, LED lighting, power storage, and smart grid industries.

The issues that we face today in resource scarcity, energy security, climate change, and particularly in competition for global economic leadership represent a challenge and an opportunity greater than any that we have previously witnessed.

The United States' global competitors understand the transformative potential of clean energy. They are aggressively seeking to establish dominant positions in key markets. They are using incentives that include direct capital investments, consumer and business tax incentives, and market making regulatory mandates.

China is an important example. The Chinese are currently investing far more in clean energy than the United States as a percentage of their GDP. Are they doing it to address their levels of pollution in CO_2? Of course they are. But they are also doing it in large part because they believe that it will lead to greater levels of national wealth and global competitiveness.

Europe has long taken a strong position with respect to carbon emissions, but Europe is also focused on developing industrial leadership in the new clean energy industries, whether that be solar in Germany and Spain, or wind in Denmark and the U.K. Even that global bastion of fossil fuels, the Middle East, is putting a great deal of capital to work in luring leading clean technology companies to locate their businesses in the developing Masdar City.

The percentage of global capital being attracted into the clean energy industries is rising. However, the danger is that instead of flowing into the United States, as it has historically done to support our leadership in information technology and in biotech, it will increasingly flow into those countries that have most clearly established their support for clean energy industries. If we fail to act, we will lose our technological edge. We will lose the jobs associated with these companies, and ultimately we will pay others to import their clean energy technologies the way that we today pay others to import their oil.

Simply put, we can't win if we don't play. The Kerry-Boxer bill is the way to ensure that the United States is in the game. Acting now signals that we intend to lead not only in building new clean energy generation, distribution and storage technologies, but also that we intend to lead in developing the technologies that will make our existing strengths in coal, oil and natural gas more competitive.

Our Nation is built on the notion of change and the ability to question the status quo. In energy more so than in any other aspect of our lives, we have drifted into a state of reliance on others. The sooner we get on with the task of building our energy infrastructure for the future, the greater the likelihood that when the rest of the world builds its clean energy infrastructure, it will look to U.S. companies to build and export those technologies.

I should also note that the clean energy industries of the 21st century are being built all across this country. As we have already seen with wind and solar, next generation lighting, advanced power storage, and electric transport will create manufacturing jobs that can be located almost anywhere in the continental United States.

The Kerry-Boxer bill has several powerful components that will demonstrate that the United States is serious. First, Senate bill 1733 will be an essential step in stabilizing the boom and bust cycle of investing in promising new technologies by setting a price on carbon. A growing percentage of the Fortune 500 community has signaled that establishing price certainty with respect to carbon is far better for business than continued uncertainty, given growing certainty elsewhere around the globe. We need this certainty even more for the emerging companies that we represent.

Second, I am pleased to see that Senate bill 1733 sets more robust targets for near term emissions. Even small increases in the 2020 target send an important signal that we need to start making changes now.

The legislation needs to be about economics and America's growth potential. We have too frequently been misled into thinking that this is a choice between the environment and prosperity. Quite to the contrary, those that win the battle for clean energy jobs and technologies will have the prosperity to afford whatever level of environmental commitment they choose.

Thank you again, Chairwoman Boxer, Ranking Member Inhofe and members of the committee, for your time.

[The prepared statement of Mr. Dolezalek follows:]

Statement of Stephan Dolezalek
Managing Director and CleanTech Group Leader, VantagePoint Venture Partners
Senate Committee on Environment and Public Works
Legislative Hearing on S. 1733, Clean Energy Jobs and American Power Act
October 29, 2009

Chairwoman Boxer, Ranking Member Inhofe and Members of the Committee, I am Stephan Dolezalek, Managing Director and CleanTech Group Leader at VantagePoint Venture Partners. Thank you for the opportunity to be here with you today to share my perspective on the need for action on this important topic.

I have spent the past 25 years working exclusively with technology companies. I have first-hand knowledge of the power of U.S. innovation that allowed our country to lead the electronics, biotechnology, and Internet revolutions of the past generation. I have been with VantagePoint for the last decade, leading our firm's decision in 2002 to begin investing in those companies that will drive the next global innovation revolution – energy. Today, VantagePoint has the largest clean energy position in the venture capital industry with over $1 billion committed, and we are the largest stockholder in many of the leading companies in the solar, vehicle electrification, biofuels, LED lighting, power storage and smart grid industries.

The issues we face in transforming the global energy sector – resource scarcity, energy security, climate change, and competition for global economic leadership – represent a challenge and an opportunity greater than we at VantagePoint have previously witnessed.

Global Competitiveness

The United States' global competitors clearly grasp the transformative potential of clean energy and are aggressively seeking to establish dominant positions in key future markets. Incentives include direct capital investment into development and deployment of clean energy, consumer and business tax incentives, and market-making regulatory mandates directed at establishing competitive advantage in key industry verticals. In almost every instance, their levels of assistance, both financial and otherwise, are matched by their commitment to addressing the issues facing our global climate and environment.

China is a valuable example: The Chinese are currently investing far more in clean energy than the United States as a percentage of GDP. Are they doing it to address their levels of pollution and CO2? Sure, but they are largely doing it because they believe that it will lead to greater levels of national wealth and global competitiveness. China is poised to become the world leader in wind turbine production this year. Wind is currently one of the most mature clean energy sectors, yet of the top five wind turbine manufacturers in the world, only one is American (General Electric). When you compare this to former American domination in past emerging markets such as the internet revolution, it is clear that the U.S. is running behind and our iconic status as the world's leading innovator is at stake.

Europe has long taken a strong position with respect to carbon emissions; but Europe is also focused on developing industrial leadership in the new clean energy industries, be that solar in Germany or Spain, or wind in Denmark and the U.K. Even the global bastion of fossil fuels, the Middle East, is putting a great deal of capital to work in luring leading clean technology companies to locate their businesses in the developing Masdar City.

We at VantagePoint have witnessed similar developments with respect to global capital flows. The percentage of global capital being attracted into the clean energy industries is rising rapidly. However, the danger is that instead of flowing into the United States, as it has done historically to support our leadership in information technology and biotechnology, it will increasingly flow into those countries that have most clearly established their support for clean energy industries.

If we fail to act, we will lose our technological edge, we will lose the jobs associated with these companies and, ultimately, we will pay others to import their clean energy technologies the way we today pay others to import their oil. Simply put: we can't win if we don't play; the Clean Energy Jobs and American Power Act is the way to ensure that the United States is in the game. By moving forward we enter the game. From there, our collective ingenuity, entrepreneurialism and "never can say die" attitude will make sure that we do much more than just compete.

Acting now with respect to the Clean Energy Jobs and American Power Act sends a strong signal that the United States is not ready to throw in the towel on economic and technological leadership. It signals that we intend to lead not only in building new clean energy generation, distribution and storage technologies, but also that we intend to lead in developing the technologies that will make our existing strengths in coal and in natural gas more competitive. Rather than signaling the fear that our industries cannot compete in a lower carbon world, it sends a clear message that we can, and intend to, lead in the development of the technologies that will maintain our global preeminence economically and in the energy supplies of the future.

U.S. Growth Potential

The challenge and opportunity that we have before us today is at least as great as what Roosevelt faced during World War II, when he retooled Detroit and spurred economic growth that fueled this country for decades. The history of our nation is built on the notion of change and the ability to question the status quo. In energy, more so than in any other aspect of our lives, we have drifted into a state of reliance on others.

Throughout our country we are seeing hints of action. We have seen what leadership like this has meant at the state level: locating renewable energy manufacturing and generation facilities in California, for instance, has been attractive due to their forward-thinking policies and incentives. But California, as you all know, has had its own budgetary constraints. As a result, the level of state financial support for the clean energy industry in California has not been exemplary. But the fact that California has set very clear standards on emissions, on fuels, and on renewable energy has sent an equally clear message about what the State sees as its future. As a result, the industries of our State have gotten the message and have retooled themselves to thrive in a clean energy environment. The Clean Energy Jobs and American Power Act sends that same message to the rest of the country: that we can and will build our energy infrastructure for the future. The sooner we get on with that task, the greater the likelihood that when the rest of the world builds its clean energy infrastructure, it will look to U.S. companies to build and export those technologies and that we will thus benefit with even greater levels of U.S. employment.

I should also note that unlike the information technology, telecomm, and biotech worlds, the jobs in clean energy are not centered around Silicon Valley. As investors that means we spend far more time travelling than we did in those industries, for the clean energy industries of the 21st Century are being built all across the country. Certain sectors, like wind and solar are concentrating in those geographies well suited for their use, but even these differ substantially between the two. The biofuels industry, meanwhile, is being grown in the agricultural belt of this nation. Next-generation lighting technologies, such as LEDs, advanced power storage (batteries) and electric transport will create manufacturing jobs that can be located almost anywhere in the continental United States. Just as other nations are attempting to copy the success of Silicon Valley in the information technologies, so too are a number of U.S. states competing successfully for the new jobs of the clean energy economy. In so doing, 27 such states have adopted their own renewable energy mandates – sending the message that they are serious about moving forward and about the importance of leadership.

The Kerry-Boxer bill has several powerful components that will demonstrate that the U.S. is serious about not only competing in the global energy race, but is determined to win.

First, S. 1733 will be an essential step in stabilizing the boom-and-bust cycle of investing in promising new technologies, by working toward setting a price signal on carbon. Such a clear signal will allow firms to make investments in clean technology based on individual efficiency and cost-effectiveness requirements to continue operating at an optimal level. Long-term market-based signals will improve the overall cost-effectiveness of a transition to a clean energy economy and be a driver for new jobs.

A growing percentage of the Fortune 500 community has signaled that establishing a price certainty with respect to carbon is far better for business than a continued uncertainty in the face of certainty elsewhere around the globe. That need for certainty is even greater for the far less mature companies we represent. Further, a long-term price signal on carbon directly correlates to investment certainty around the viability of clean technology. Without such investment certainty, there will be no serious innovation at scale. Clear and attractive regulatory policies are vital for young clean energy companies to secure the level of capital required to drive research and development and even more so, to scale their technologies for widespread commercialization.

Second, I am pleased to see that S. 1733 sets more robust targets that the House for near-term emissions reductions. Even small increases in the 2020 targets from Waxman-Markey send an important signal that we need to address changes now, rather than at some time in the future. Most of our investments come to maturity in 5-7 years, so the 2020 targets are particularly relevant for new companies developing clean energy solutions.

Third, clean tech innovation is unique in that it requires substantial amounts of capital in order to ensure successful ramp up to commercialization. Because of that, sector-specific policy drivers will be needed to demonstrate the government is behind this growth by underwriting a portion of the inherent risk. The Chairman's Mark makes a vital capital commitment to this need in order to drive growth in the domestic clean energy industry. The allocation of resources to energy efficiency efforts, advanced energy R&D as well as electric vehicles and advanced automotive technology is a clear indicator that the US intends to be competitive in at least some of the most globally competitive aspects of this economic competition.

For the United States, this legislation is about economics and America's growth potential. We have too frequently been misled into thinking it was a choice between the environment and prosperity. Quite to the contrary, those that win the battle for clean energy jobs and technologies will have the prosperity to afford whatever level of environmental commitment they choose.

I am here speaking to you both as a cleantech investor and as a father of two teenage sons. As an investor, I represent a global pool of capital and a global set of investment opportunities. As with any other global investment manager, I am given the constant opportunity to evaluate investment opportunities in U.S. clean energy companies against those presented by their foreign counterparts.

As a father, however, I am focused on doing all I can to ensure that our country acts in a way that provides the opportunity for economic prosperity and a healthy life for my children. I have spent the last 25 years developing the technologies that make a world of information available to not only my own children, but to others around the world, at a cost affordable by almost all – through computers, cell phones and the Internet. In addition, I have helped my companies develop drugs that allow us to address some of the most serious diseases we face. We have done many things deemed "impossible" less than a decade ago. But we did so because we believed in the power of American ingenuity, in our legacy of invention and of building the infrastructures that supported those inventions from the national railroad system to the federal highway system to the telecommunications and Internet infrastructure we today enjoy. We now face the opportunity of setting forth toward a future that will provide our children with energy that is secure, affordable, clean and abundant, but we will only do so in this country if we act now to clearly establish that this is where we are going. The Clean Energy Jobs and American Power Act sends just that message.

That is the future that I want for my children, here in America. Thank you again Chairwoman Boxer, Ranking Member Inhofe and members of the Committee, for your time.

cleantech GROUP LLC

China Huaneng plans clean-coal export to U.S.
By *Emma Ritch*
Published *2009-04-20 11:30*

State-owned power developer China Huaneng Group [1] said it signed an agreement to export its clean coal technology to a 150-megawatt power plant in Pennsylvania.

The agreement calls for China Huaneng's subsidiary Xi'an Thermal Power Research Institute to supply Houston, Texas-based Future Fuels with a two-stage pulverized coal pressure gasification technology. The technology is expected to be incorporated in Future Fuel's 150 MW integrated gasification combined cycle (IGCC) plant to be built in 2010 in Schuylkill County, Penn.

Financial terms of the deal were not disclosed. Immersive Media has invested $5 million in convertible senior debt for the Schuykill plant, being built by Future Fuels subsidiary Future Power.

The technology can reduce the carbon dioxide emitted from a standard coal-fired power plant, but many in the industry take issue with calling the technology 'clean' because of its environmental cost.

Future Fuels is planning a $1.5 billion clean-coal project for southeastern Kentucky and is undergoing a market syudy for another plant in Wyoming.

China has focused on reducing the emissions from its coal plants by replacing old plants with newer, more efficient models. Those upgrades have reduced the coal needed to produce a kilowatt-hour of electricity from 370 grams in 2005 to 349 grams in 2008 (see China to close 31GW of coal power plants [2]). Some new technologies promise 1 kWh for just 283
grams of coal.

China Huaneng has collaborated with St. Louis, Mo.-based Peabody Energy [3] (NYSE: BTU [4]) on the GreenGen project in China, a near-zero emissions coal-fueled IGCC power plant in Tianjin, southeast of Beijing (see Peabody joins China's GreenGen clean coal project [5]).

Huaneng is also a member of the FutureGen Alliance, a partnership with the U.S. Department of Energy to develop and site a 275 MW technology prototype that also would achieve near-zero emissions with carbon capture and storage (see FutureGen to build plant in Mattoon, Ill. [6]).

Huaneng plans to increase its generating capacity in 2010 to 80 GW, representing 10 percent of the national energy supply.

In October, the company signed a RMB 5 billion ($735 million) deal to construct a 500 MW wind farm in eastern Inner Mongolia by 2010 (see China plans 2.4GW wind power projects [7]). Huaneng is also one of 50 companies to submit bids for a 10 MW solar power station in Dunhuang, Gansu province, China (see Suntech among 50 global bids for solar project in China [8]).

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[7] http://cleantech.com/news/3738/china-plans-24gw-wind-power-projects
[8] http://cleantech.com/news/4275/suntech-among-50-bids-solar-project

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This responds to the question submitted by Senator Sanders with respect to whether I would support including a cost-effective, flexible energy efficiency investment requirement for the electric utility allocation, similar to what was required for the natural gas allocation. In responding, I assume that what the Senator is referring to is a provision similar to that suggested by the American Council for an Energy-Efficient Economy (the "ACEEE). Specifically, the ACEEE proposed the following:

- Supporting a strengthened Energy Efficiency Resource Standard (EERS) requiring utility companies to reduce their energy usage by at least 10 percent by providing incentives and assistance to help customers make their homes and businesses more energy-efficient (ACESA included a 5% EERS with an optional 3% increase).

- Modeling electric utility allocation on that of the natural gas utility allocation in ACES, by requiring that one-third be used for energy efficiency improvements.

These proposals build upon some of the experience obtained through the Regional Greenhouse Gas Initiative (RGGI), an eight-state carbon cap-and-trade program stretching from Maine to Maryland. As such they are a laudable proposal to focus on one of the best means to accomplish carbon reductions – namely energy efficiency measures.

In general, I would support such an inclusion; provided that it did not in any way diminish allocations otherwise in favor of renewable energy contained in the bill. To the extent allocations are distributed among numerous competing interests, Congress should ensure that the specific allocation scheme is best designed to drive markets toward innovation. The benefits of energy efficiency are clear and this sector is worthy of Federal market making policies and investment to help drive consumer demand.

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Senator BOXER. Thank you so much for very good testimony.

And now it is David Hawkins, Director, Climate Center, Natural Resources Defense Council. He has worked for NRDC for more than 30 years, except he took time out to work in the Carter administration. And he is, as most of us know, NRDC is a member of USCAP. And I just want to say how helpful, Mr. Hawkins, you have been in just helping us get to the facts, and NRDC to be there as a resource, it has been very helpful to all of us who work on this bill.

Welcome.

STATEMENT OF DAVID HAWKINS, DIRECTOR, CLIMATE CENTER, NATURAL RESOURCES DEFENSE COUNCIL

Mr. HAWKINS. Thank you, Madam Chairman. And thank you for having me before the committee again.

I would like to start with two broad points. First, protecting the climate is an opportunity that is disguised as a challenge. The billions of dollars that we spend to cut greenhouse gas emissions are going to be spent on good things. They are going to be spent delivering new industries, delivering new jobs and delivering a stronger, more secure energy future for us.

The second thing is that action now is going to help, not hurt, total economic growth. Why do I say this? Well, left unchecked, climate disruption is also going to disrupt the economy. That is something that is easy to miss because all the economic analyses that we look at have a business as usual forecast for economic growth that assumes that climate is going to have no effect whatsoever on economic growth.

We know that is wrong. We know there will be disruption of the economy. So any analyses that you see that suggests that there is a cost to doing this are ignoring the fact that the baseline economic growth with a disrupted economy is going to be a lot lower than the one you are being told about.

Next, I would like to talk about some key design principles for the legislation. First, a good target for 2020 is critical. The Kerry-Boxer bill aims for 20 percent cut in 2020. We should keep that target. It is feasible without adverse economic impact. Because of banking, borrowing, cost controls, we can set a 2020 target with minimal added program costs. EPA estimates maybe a 1 percent additional impact.

We need at least this reduction to put us on a path to the deeper reductions that we need later. And we need this reduction to support the level of ambition that we require from other countries. The rest of the world is anxious to match U.S. leadership, but we have to provide it.

Second, cost containment must protect emission reduction targets and not bust the cap. The bill's strategic reserve will provide price protection. We need to work within that framework and not adopt approaches that would increase allowable emissions.

Third, effective offset regulation is critical. Offset compliance instruments, no less than modern financial instruments, require careful oversight. We have seen what divided regulatory authority has done in the financial markets. We must not permit that to happen in offset markets. EPA should be given primary oversight authority with broad consultation with expert agencies like the Department of Agriculture.

Fourth, we need to use performance standards to complement the cap. A broad cap is a core tool, but performance standards for key sectors can help us make progress at the speed we need. Vehicles, vehicle fuels, power generation, buildings, appliance, all are key contributors to total emissions, and new investments in these sectors should be guided by effective minimum performance standards in this bill, and by retaining Clean Air Act authorities. This bill and current law can work effectively together and we strongly support retention of current Clean Air Act performance standards authorities.

Fifth, the power of efficiency. Efficiency investments work. When we spend less money on fuel, we free up money to create jobs. Over the past 30 years, California has saved $56 billion through efficiency and created one and a half million more jobs. With the changes we recommend, the Kerry-Boxer bill can do an even better job of producing efficiency. We recommend that State regulators be directed to put at least a third of allowances given to the local distribution companies into cost effective energy efficiency investments.

Sixth, a sound bio-energy framework is critical. Greater reliance on bio-energy can have great benefits, but only if it is done right. That means we need to calculate greenhouse gas emissions fully and not assume that all bio-energy has zero net emissions.

Second, we need to remember that bio-energy on the landscape can be in tension with other core values, including protection of biodiversity, habitats, and water resources. We must maintain safeguards to assure the growing bio-energy industry does not threaten these values.

To wrap up, I recently read Senator Everett Dirksen's speech to the Senate from 45 years ago pleading for an end to the filibuster on the great Civil Rights Act of 1964. He said, "Stronger than all the armies is an idea whose time has come." He continued, "There is another reason why we dare not temporize with the issue which is before us. It is essentially moral in character. It must be resolved. It will not go away. Its time has come. Nor is it the first time in our history that an issue with moral connotations and implications has swept away the resistance, the fulminations, the legalistic speeches, the ardent but dubious arguments, the lamentations and the thought patterns of an earlier generation, and we pushed forward to fruition."

Thank you for the opportunity to testify.

[The prepared statement of Mr. Hawkins follows:]

Testimony of David G. Hawkins
Director of Climate Programs
Natural Resources Defense Council

before the
Senate Environment and Public Works Committee

Legislative Hearing on S. 1733,
Clean Energy Jobs and American Power Act
October 29, 2009

Thank you, Chairman Boxer and Senator Inhofe, for the opportunity to testify today on S. 1733, the Clean Energy Jobs and American Power Act. My name is David Hawkins. I am Director of Climate Programs at the Natural Resources Defense Council (NRDC). NRDC is a national, nonprofit organization of scientists, lawyers and environmental specialists dedicated to protecting public health and the environment. Founded in 1970, NRDC has more than 1.3 million members and online activists nationwide, served from offices in New York, Washington, Los Angeles and San Francisco, Chicago and Beijing.

Introduction

The Clean Energy Jobs and American Power Act will put America on the path to clean energy -- a path that will lead to a growing economy with more jobs created here and fewer dollars shipped overseas to chase increasingly insecure supplies of dirty energy. S. 1733 will ensure that we will meet more of our energy needs with home-grown, clean resources: using American technology to waste less energy and to increase our use of wind, energy from the sun, and sustainable sources of bioenergy. We will also harness America's enormous talent in business, labor and our wealth of resources to shape our future and not just cope with it.

The foundation of the American economy, indeed the foundation of the wealth of all nations, is the global climate system that has allowed agricultural production to increase on a massive scale since the last ice age, feeding a growing global population and creating surpluses that have enabled the growth of commerce and industry. Because we have enjoyed a stable and hospitable climate for as long as our history records, it is easy for us to take it for granted and to assume that nothing humans can do could possibly threaten that stability. But for the past several decades scientists have been telling us were are wrong to take a stable climate for granted. We know now that we are putting our planet's climate at risk, and with it risking the foundation of human well-being.

But we also know now that we have the power to confront this threat. Confronting global warming will require us to apply our ingenuity to a huge task that presents huge opportunities. But American workers and American businesses have the power to build a clean energy future that will enhance our standard of living and protect the earth's climate. We have the power to earn our place anew as a world leader in the creation of new industries that will strengthen our economy, improve energy security, and curb the threat of a disrupted climate. As President Obama said last Friday:

> Today's frontiers can't be found on a map. They're being explored in our classrooms and our laboratories, in our start-ups and our factories. And today's pioneers are not traveling to some far flung place. These pioneers are all around us -- the entrepreneurs and the inventors, the researchers, the engineers -- helping to lead us into the future, just as they have in the past. This is the nation that has led the world for two centuries in the pursuit of discovery. This is the nation that will lead the clean energy economy of tomorrow, so long as all of us remember

> what we have achieved in the past and we use that to inspire us to achieve even more in the future.

But to harness that power, the private sector needs a policy framework to reward investment decisions that choose cleaner, low-carbon options over outmoded high-carbon products and practices. We know these cleaner options exist but they will not penetrate the marketplace while policies that reward dirtier options remain in place. When some argue today that these cleaner options are just not economic or competitive what they are really saying is that today's market incentives reward dirty energy choices.

S.1733 would provide a framework to reward clean energy investments while helping consumers and industries that today rely heavily on traditional energy resources transition smoothly to the new path. The framework starts with a broad limit on U.S. global warming pollution that declines steadily over the next four decades. The bill allows each emitter flexibility in meeting its part of the overall limit by creating a system of permits to emit, or "allowances," that can be bought, sold, or saved for later use. This framework rewards firms that find ways to meet our needs for power, heat, light, comfort, convenience and mobility and reduce global warming pollution at the same time. The new allowance market also produces value that can be employed to meet key public policy goals, including consumer protection, preserving competitiveness, worker protection and training, stimulating pioneer investments in promising technologies that are not yet commercially viable, reducing deforestation, and supporting state and local clean energy and adaptation programs.

Additional key elements of the framework for jobs, energy security and climate protection are incentives and performance requirements for low-carbon energy investments in key sectors of the economy. These provisions complement the overall national limit on pollution by accelerating innovation in the design of vehicles, fuels, electric power, buildings, and appliances. The market signal delivered by the declining limit on overall emissions would drive these changes eventually, but we can make progress faster, and often at lower cost, with a system of well-designed performance incentives and standards that take advantage of each sector's ability to improve performance more rapidly.

The policy framework contained in S. 1733 is overdue. Had we enacted this law a decade ago, America today would be a global leader in climate protection and a model for other countries to emulate; we would be less dependent on foreign oil; and we would have created millions of jobs in the clean energy economy for the 21st Century. We have lost much ground by delay. Indeed, the International Energy Agency estimates that each year of delay in tackling the threat of climate change will cost the global economy about one-half a trillion dollars annually. We cannot regain those lost years but we can avoid losing more time by acting now. For that reason, NRDC strongly supports action by this Committee to report S. 1733 to the full Senate without delay.

I. We Must Act Now

Action on global warming has been delayed far too long. Every day we learn more about the ways in which global warming is already harming our planet, our health, and the natural systems on which our civilization is built. We must act now to begin making serious emission reductions if we are to avoid truly dangerous levels of global warming pollution. Climate scientists warn us that we face extreme dangers if global average temperatures are allowed to increase by more than 2 degrees Fahrenheit from today's levels (equivalent to 2 degrees Celsius over pre-industrial levels). The Intergovernmental Panel on Climate Change (IPCC) reports that it is still possible to stay below this temperature increase if atmospheric concentrations of CO_2 and other global warming gases are held to 450 ppm CO_2-equivalent and then rapidly reduced.

Staying under this target is very challenging, even with allowance for some period of "overshoot." It cannot be done without the cooperation of both the industrial North and the emerging South. But it can be done, as demonstrated in EPA's analysis of S.1733.[1] And for the United States to secure a claim to leadership in the 21st century, we must be instrumental in forging the necessary coalition. Enacting U.S. legislation is the single most important step we can take to unlock the global negotiating gridlock of the past decade.

If we delay and emissions keep growing, bad investments and business uncertainty will continue and it will become much harder to avoid the worst impacts of a climate gone haywire. In short, a slow start means a crash finish, with steeper and more disruptive emission cuts required for each year of delay or insufficient action.

S. 1733 appropriately establishes a declining cap on emissions of carbon dioxide and other heat-trapping gases. It sets long-term limits that are consistent with the science, reaching a 42 percent reduction by 2030 and an 83 percent reduction by 2050, from 2005 levels. S. 1733's near-term limits are an improvement on legislation in the House. NRDC believes we can and should achieve at least a 20 percent reduction in 2020 in the emissions of capped sources and in total U.S. emissions. We strongly support the inclusion of this target in S. 1733.

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[1] EPA, Economic Impacts of S.1733. October 23, 2009. EPA's analysis shows that enactment of S.1733 in conjunction with emission reductions by other countries consistent with the 2009 G8 declaration would limit atmospheric CO2-equivalent concentrations to 485 ppm in 2100 and keep global warming below 2°C based on the IPCC's best estimate of climate sensitivity.

According to the Environmental Protection Agency the average per household cost of S. 1733 would be less than $120 per year.[2] NRDC's research shows that under the House bill American households will save $6 per month on their electricity bills in 2020. Similarly, EPA's analysis of the House bill found that household energy expenditures would decrease 7% in 2020. Meanwhile, NRDC's analysis found that the cost of owning and driving a vehicle will decline by $14 per month. Equally important, EPA's analysis shows that average annual household income will increase by more than $7,000 between 2009 and 2020 with or without a climate bill.[3] EPA's analysis of S.1733 concluded that household costs would be very similar to those under the House bill.

In addition, both the House bill and S. 1733 will create more jobs -- a net increase of as many as 1.9 million jobs with effective policies to capture available cost-effective energy efficiency opportunities.[4] These savings and job numbers are detailed on a state-by-state basis in the maps appended to this testimony.

Some will argue that a 20 percent reduction target for 2020 is too aggressive and would place too much pressure on coal-fired electricity or energy-intensive, trade-exposed manufacturing, and on the regions where those industries are most important. A 20 percent reduction in 2020, however, is within the range recommended by the US Climate Action Partnership (USCAP), and EPA's analysis of S.1733 concludes that allowance prices will only be about one percent higher than they would be with a 17 percent reduction in 2020.[5] The most recent Department of Energy reference case forecast is for U.S. emissions of energy-related carbon dioxide in 2020 to be 1 percent *lower* than 2005 levels, in sharp contrast to the 17 percent increase forecast for 2020 just two years ago.[6] This indicates that achieving a 20 percent reduction by 2020 will actually be far easier than the effort previously anticipated to be required to achieve less ambitious reductions.

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[2] EPA, Economic Impacts of S.1733. October 23, 2009, p. 19.

[3] EPA, 2009. H.R.2454 Data Annex, IGEM model. (adjusted by converting to 2007$, discounted at 5%). http://www.epa.gov/climatechange/economics/economicanalyses.html

[4] D. Roland-Holst and F. Kahrl, October 23, 2009. Clean Energy and Climate Policy for U.S. Growth and Job Creation. http://are.berkeley.edu/~dwrh/CERES_Web/

Furthermore, S. 1733's allowance distribution gives the local electricity distribution companies and energy-intensive, trade-exposed manufacturers a large fraction of the allowances they will need for compliance well past 2020. And the bill provides generous incentives for investing in power plants and other industrial facilities equipped with carbon capture and storage. The bill also allows the use of up to two billion tons of offsets per year to further cushion these concerns. A twenty percent reduction by 2020 is both needed and do-able.

II. S. 1733 Relies on a Proven Approach

To meet the climate protection challenge, S.1733 employs a fundamentally sound architecture. It establishes a declining cap between 2012 and 2050, covering approximately 85 percent of U.S. emissions of carbon dioxide and other heat-trapping gases. The cap directly attacks the pollution that drives global warming by setting a specific limit on the total quantity of dangerous pollution emitted each year, creating certainty that our environmental goals will be achieved.

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[5] EPA, Economic Impacts of S.1733, October 23, 2009, p.3.

[6] DOE/EIA Annual Energy Outlook 2009 with ARRA (SR/OIAF/2009-03) compared to the Annual Energy Outlook 2007.

S.1733 uses proven methods to achieve this pollution cap at minimum cost. Instead of specifying exactly what every source must do to help meet the cap, it creates a defined number of carbon pollution allowances. Covered sources must surrender an allowance for each ton of carbon emissions at the end of each year. The opportunity to purchase allowances at auction, or to buy and sell them in the marketplace, creates clear economic rewards for investing in energy efficiency and clean energy innovation and allows each covered source to find its lowest cost way to comply – thereby minimizing the cost for the entire economy. Additional cost management flexibility comes from the ability to bank allowances into future years, to borrow them in limited circumstances, and to accelerate investment in low-carbon technologies using allowance allocations as a form of bankable collateral.

For further market stability and predictability, S. 1733 creates a strategic reserve of allowances that can be sold into the market should there be a period of unusually high prices. The reserve created under S. 1733 is much larger than the one provided by the House-passed bill, and S. 1733 provides simpler and sounder operating rules. The very existence of this large reserve should deter speculative activity in the compliance market as it has the potential, during the first twenty years of the program, to release more than 3.5 times the maximum annual change in U.S. carbon emissions during the last twenty years.[7]. To avoid market prices so low that innovation could be stifled, the bill also establishes a minimum price for sales of allowances from the legislation's regular auction.

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[7] NRDC calculation based on EIA data. The maximum annual emissions increase in the last twenty years was 186 million tons in 1996. The maximum release form the market stability reserve in 2012, for example, is 15 percent of the 2012 cap, or 694 million allowances, which is 3.7 times the 1996 emissions increase.

S. 1733 builds on the cost-containment structure in the House bill but modifies it in several ways to improve its ability to prevent excessively high allowance prices and price volatility. In essence, S.1733 creates a very large reservoir of allowances that all market participants know will be released into the market should prices rise above defined levels. In S.1733 (unlike in H.R.2454) this "trigger" price is clearly defined in advance. The size of the reserve and the number of allowances that can be released from the reserve in any given year are also substantially larger in S.1733 compared to H.R.2454, leading EPA to conclude that S.1733 will provide better price certainty. This will deter speculation and create confidence in the system's performance.

S. 1733 also provides for very large amounts of domestic and international offsets – up to two billion tons per year of reductions achieved outside the capped sectors – to further reduce costs. S. 1733 creates a preference for domestic offsets, with flexibility to increase use of international offsets should the supply of domestic offsets be constrained. With a reasonable limit on the total number of offsets, and with strong safeguards to assure that offset credits are earned only for real reductions that would not have happened anyway, offsets can be a valuable component of climate legislation.

S. 1733 includes important principles about the need to transparently and effectively regulate the market for trading greenhouse gas allowances, as well as futures and other derivatives. Given recent experience on some other trading markets, the American people have a right to demand that rules for regulating carbon trading be clear and transparent, and effective in preventing speculative manipulation. NRDC recommends incorporating provisions similar to those included in the Feinstein-Snowe bill, S.1399.

In addition, NRDC recommends including three additional safeguards:

First, the Senate should consider requiring all trading in allowances and in futures to take place on regulated exchanges to provide the greatest possible transparency to trading activity and prices, and to reduce counter-party risk – the risk that one of the contract participants will fail to perform when the contract is due. At a minimum, the bill should require the reporting to regulators of all non-standardized trades greater than a specified amount – for example, above $10 million – that take place in the "dark" or unregulated markets. As a further safeguard against manipulation, Congress should set tighter "position limits" on the fraction of allowance futures that any one participant can hold in the carbon market. We recommend that no one be allowed to have more than a 5 percent (not 10 percent as in H.R. 2454) position in the market for the most actively traded futures (for example, the market for contracts to deliver allowances at the end of the next compliance year). This is roughly twice as large as the speculative position limits established under the Commodity Exchange Act for agricultural commodities. It would be more than sufficient for hedging and trading purposes and would deny any single market participant the market power to meaningfully influence prices. Congress should also direct the administration to work with other nations to provide comparable safeguards as a condition of linkage to the U.S. carbon market.

Is there a viable alternative to this cap and trade architecture? Comprehensive cap bills like S. 1733 have been attacked from two contradictory flanks. First, there are those who mischaracterize cap and trade proposals as tax bills, and oppose them for that reason. S. 1733 is not a tax any more than any of the nation's other air and water pollution control laws are. Rather, it is a smart method for guaranteeing a firm overall limit on carbon pollution, directly tied to protecting us from the worst effects of global warming, while allowing individual sources a great deal of flexibility to find the lowest cost pathway to compliance.

At the opposite extreme, there are opponents of cap and trade legislation who say it *should be* a tax, and oppose it because it is not. Beyond the obvious political obstacles to this approach, NRDC does not support a carbon tax first and foremost because it would not guarantee achievement of the emissions reductions necessary to limit cumulative emissions over time to a level compatible with a stable climate. A carbon tax would represent, at best, a congressional guess at the imposed cost needed to induce myriad covered sources to limit their emissions enough to meet desired annual emissions targets for the country as a whole. That guess could be wrong on the high or low side – most likely on the low side given the aversion of many political actors to charges of raising taxes. It would require Congress to constantly reconsider the tax rate – or to adopt some form of automatic adjustment.

Some carbon tax proponents claim a tax would be a lot simpler than cap and trade. But this is the fallacy of comparing an idealized concept to a flesh and blood bill. When was the last time Congress wrote a simple tax bill? There would be just as many pressures for exemptions, exceptions, offsets, and other special treatment as we have seen regarding emission cap bills. In short, a carbon tax would be neither environmentally effective, simple, nor politically appealing. The architecture of S. 1733 is proven to work and is a far better alternative.

Other opponents of this legislation have argued for a "New Manhattan Project" like the substitute offered on the House floor that would have authorized a grab-bag of goals, prizes, and grants for new technologies. While most of the goals are laudable, and while prizes and grants have their place, there are two fatal flaws to the call for a grand-scale research and development program as an alternative to a comprehensive cap and invest approach. First, the proponents of the Manhattan project have identified no viable means of providing the funding they advocate – without an allowance system created by an emissions cap, they would have to rely entirely on ever-more-difficult annual appropriations. Second, government-sponsored research and prizes, while useful, cannot remotely hope to create private sector incentives for clean energy innovation on the necessary scale. In marked contrast, S. 1733 does create incentives on this scale by establishing an ever tighter cap on emissions that tells every innovator large and small that there is a predictable, expanding market for low-carbon products and services.

The primary barrier to a clean energy economy is not a shortage of American ingenuity or even a shortage of financial resources to apply to the task; it is the lack of a powerful and sustained set of predictable market rewards that are needed to motivate private sector innovators to invest in bringing low-carbon options to market rather than products and services where the carbon footprint is ignored. In addition to the market signal created by the declining cap itself, S. 1733 uses some allowances strategically to invest in efficiency and clean energy technology. As I explain below, S. 1733's allowance allocation can be further improved to more fully seize the cost-saving energy efficiency opportunity and save American households and businesses even more.

Other opponents of this legislation are touting a collection of worn-out ideas that have been stitched together under the catchy name "All of the Above." The list includes massive subsidies and free rides for all the old energy technologies, with just enough window-dressing on efficiency and renewables to support a talking point or two. In the simplest terms, this is a recipe for *increasing* our carbon pollution, *increasing* our energy bills, *reducing* our energy security, and doing *nothing* to help re-power the American economy. A program that lacks a cap on carbon pollution, and pursues every energy option regardless of merit, just lets global warming keep getting worse and makes our energy and economic challenges worse.

Effective answers for climate protection, energy security, and economic vitality can be found only by wasting less and investing serious sums in clean energy resources, all within the framework of clear limits on global warming pollution. Of all these approaches, only comprehensive legislation like S. 1733 will create the clarity and drivers for the investments we need to shift to the low-carbon economy.

III. Complementary Standards and Policies to Enhance Emission Reductions and Adaptation to Climate Change

A key element of comprehensive clean energy and climate protection legislation is provision for complementary energy efficiency, renewable electricity, and carbon pollution control standards. Strong energy efficiency standards for buildings, appliances, vehicles, and other equipment are crucial to meeting our carbon pollution goals effectively and at the lowest cost. In fact, still-untapped energy efficiency opportunities can save thousands of dollars per household. We encourage this Committee to work with the Energy and Natural Resources Committee to include such measures in the bill that goes to the floor so we can achieve the maximum gains in these areas.

In areas within this Committee's jurisdiction, S. 1733 contains important carbon pollution performance standards for vehicles and power plants. With regard to light-duty vehicles, it appropriately leaves in place the current requirements of the Clean Air Act under which California and EPA are setting greenhouse gas standards and the Department of Transportation is setting mileage standards. Under the historic agreement announced by President Obama in May, and the standards proposed by EPA and DOT in September, these three regimes will be coordinated and will deliver the benefits of the California program nationwide. S. 1733 includes specific mandates to use existing Clean Air Act authority to set greenhouse gas standards for other classes of vehicles and equipment. Further improvements can be made in these areas to deliver more emission reductions – and fuel savings – from a wide range of mobile sources, including aircraft.

The role of carbon capture and disposal

S. 1733 also includes new standards and incentives to deploy carbon capture and disposal technology at scale. Because of the importance of these provisions in shaping future investments in coal both in the U.S. and globally, I will discuss these coal sections in some detail.

To reduce the contribution to global warming from coal use, we can pursue efficiency and renewables to limit the total amount of coal we consume but to cut emissions from the coal we *do* use, we must deploy and improve systems that will keep the carbon in coal out of the atmosphere, specifically systems that capture carbon dioxide (CO_2) from coal-fired power plants and other industrial sources for safe and effective disposal in geologic formations. These systems are referred to as carbon capture and storage (CCS) or carbon capture and disposal (CCD), which is the term I will use.

If we decide to do it, the U.S. and the world could build and operate new coal plants so that their CO_2 is returned to the ground rather than polluting the atmosphere. S. 1733 contains a comprehensive approach to make this happen in the U.S. Modeled closely on the USCAP Blueprint for Legislative Action recommendations, the bill combines a declining cap on greenhouse gas emissions with emission standards that will require new coal plants to capture a substantial amount of their CO_2 emissions. In addition, to allow CCD to be deployed without significant impacts on consumers' electricity rates, S. 1733 provides for a program of direct payments for capture and disposal of CO_2 from the early generations of new coal plants.

CCD provisions in S. 1733

S. 1733 provides a strong foundation for the deployment of CCD systems that can achieve substantial reductions in emissions from large fossil fuel sources. In NRDC's opinion, proposed sections 121, 122, and 123 of S. 1733 would effectively implement the USCAP recommendation to develop and implement a national strategy to address legal and regulatory barriers to commercial-scale CCD deployment. However, we believe that it would be better to meld proposed sections 121 and 123 together in a manner that coordinates the timelines for action. We also recommend that proposed section 122 (a) specifically state that the regulations promulgated by the Administrator will apply at a minimum to hydrocarbon reservoirs and deep saline formations.

Section 124 of S. 1733 creates a new section 812 to the Clean Air Act that establishes a vital carbon dioxide emission standard for new coal power plants initially permitted after January 1, 2009. The mandatory emission standard in S. 1733 is expressed as a minimum percentage reduction in annual CO_2 emissions produced by the unit: for units permitted after January 1, 2009 and before January 1, 2020, a 50% minimum reduction is required; for units permitted on or after January 1, 2020, the unit must achieve a 65% minimum reduction or meet any more stringent requirement established by EPA.

In S. 1733, the mandatory emission standard compliance dates for units permitted before 2020 are somewhat delayed compared to the USCAP recommendations but as discussed below, the CCD financial incentives program is structured to provide a strong economic incentive for earlier compliance. Units permitted on or after January 1, 2020 must meet the minimum emission standard upon initial operation. In general, new units permitted before 2020 must comply within four years after a minimum amount of electric generating capacity equipped with CCD systems is in commercial operation in the U.S. but in no event later than 2020.[8] Compared to the House bill, S.1733 increases the CCD capacity trigger from 4 gigawatts to 10 gigawatts (GW) but establishes 2020 as the outside compliance date, rather than 2025. NRDC does not believe that operation of 10 GW of capacity is required to prove that CCD is commercially viable but we do support advancing the mandatory compliance date to 2020.

Section 780 of S. 1733 creates a program for direct payments for CO_2 captured from power plants and other industrial sources and disposed of in permanent geologic repositories. The CCD program is structured to reward early projects and projects that achieve greater reductions than the minimum emission standards set in new CAA section 812. In contrast to traditional government R&D grant programs, the earliest projects do not apply for grant approval. Rather, they are paid for performance with a statutory schedule of payments in dollars per ton of CO_2 avoided[9] through the use of CCD systems. The CCD bonus program is technology neutral, with no capture system favored over another. The Chair's Mark for S. 1733 includes a provision for receipt of advance payments for CCD projects. This should ease financing for such projects but will have to be carefully designed to assure that the objective of paying only for actual performance is achieved in practice.

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[8] There is provision for a case-by-case 18-month extension of the 2025 date upon a showing of technical infeasibility for the unit.

As I mentioned, S. 1733 provides an incentive for earlier compliance by reducing or eliminating the amount of CCD payments available to units that fail to meet minimum standards upon startup. However, a technical correction to the Chair's Mark is required to address a conflict between the allowance eligibility conditions and the advance payment provisions. While subsection 780(f)(3) bars post-2105 units from receiving any bonus allowances unless they meet the minimum emission limits on startup, subsection (f)(4) does not include an express provision for immediate recovery of all advance payments previously made to a unit if it fails to comply on startup.

The provisions of S. 1733 will help speed the deployment of CCD here at home and set an example of leadership globally. That leadership will help reconcile coal and climate protection; it will bring us economic rewards in the new business opportunities it creates here and abroad; and it will speed engagement by critical countries like China and India.

The first CCD projects are technically ready for deployment today but the lack of a policy framework means there are regulatory and economic barriers that are difficult to overcome. S. 1733 would correct this problem by directing the adoption of required siting rules and providing both the financial incentives and clear standards for emission performance that are needed to make CCD a reality in a timely manner.

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[9] Technically, the provision awards allowances, not dollars. But the number of allowances is prescribed to equal a specified dollar per ton value.

Clean Air Act and State program provisions in S. 1733

In constructing a new program to cap and reduce carbon pollution, we should build on, not replace, the existing Clean Air Act. We strongly support the fact that S. 1733 recognizes and retains this approach.

S. 1733 preserves the New Source Performance Standards authority of the Clean Air Act for sources covered by the bill's cap and preserves the current Act's New Source Review (NSR) provisions for major sources, capped or not. NRDC believes this approach correctly maintains the government's ability to establish reasonable and affordable performance requirements that would complement the cap and contribute to achieving the goals of S. 1733 in an efficient and cost-effective manner.

Since the first comprehensive federal clean air law enacted in 1970, Congress has recognized the value of providing complementary approaches to achieving our air quality and emissions objectives, rather than relying exclusively on a single instrument. Thus, Congress coupled an air quality management program focused on ambient air concentrations of pollutants and state implementation plans (sections 108-110) with technology-based programs to continuously reduce emissions from motor vehicles (section 202) and large stationary air pollution sources (section 111). Congress created this dual system because it recognized that without emission reductions from these sources as technology evolves, there would be too much strain placed on the ambient air quality standards program. In the 1977 amendments to the Act, Congress established a case-by-case process under the NSR Program in order to assure a more rapid updating of improvements in pollution control technology as new plants were built and old ones modernized.

The argument has been made that with an overall cap or budget on greenhouse gas emissions, we should simply not care about the amount of emissions from individual sources or even entire sectors. But Congress rejected that approach in the 1990 amendments when it enacted a cap on sulfur dioxide emissions from the electric power sector to combat acid rain. Congress retained the NSPS and NSR programs for the sources covered under the acid rain program, and those programs have continued to function well to minimize emissions from new sources, thereby reducing pressure on the sulfur dioxide cap and demonstrating improved and less expensive means of emission reduction that can be used to reduce emissions from existing sources as well.

As for acid rain, in this case the cap on total greenhouse gas emissions is a core element of an effective greenhouse gas reduction strategy. It creates a market for the many innovations that will be required to achieve the deep reductions we need to protect the climate. But we should not rely on this alone. The RECLAIM program in Southern California is an example of overreliance on the cap mechanism alone: there exclusive reliance on a cap program led to long delays in reducing emissions from major sources, and to a totally avoidable compliance crisis when the final deadline arrived.

For these reasons, NRDC believes it is important to preserve EPA's authority to set reasonable emission standards under Section 111 for major industrial sources, even those that are subject to the cap. We also recommend retention of NSR provisions for large sources of greenhouse gas emissions. Critics have complained that applying NSR to carbon pollution would result in burdensome coverage of barbecues and donut shops. That concern is easily addressed by raising the NSR threshold to a level that would cover only truly large industrial sources, such as 25,000 tons per year of CO_2-equivalent emissions. EPA has proposed a rule to make this change in the NSR threshold, and we recommend including it in this legislation.

New legislation should also retain important provisions of the current Clean Air Act that protect the rights of states to go beyond federal minimum requirements. During past periods of federal abdication, states pioneered control of greenhouse gas emissions from vehicles, and they developed effective programs to deploy energy efficiency and renewable energy resources. States, and entities that states regulate (such as local distribution companies) have program delivery capabilities that the federal government cannot match. If the federal program should fall short of what is needed at some point in the future, it is extremely important that states be able to pick up the slack once again.

Recognizing the potential value of integrating state programs into a suitable national program, NRDC recommends a means through which states can voluntarily suspend the adoption or enforcement of state caps so long as the national program provides a strong national cap but which retains other state authorities and adequately supports state energy efficiency, renewable energy, and transportation efficiency programs.

The bill also should provide a means to assure that the carbon reduction benefits of state energy efficiency and renewable energy deployment programs will not be lost when we have a national carbon cap. The bill should allow states to obtain a reduction in the national cap by an appropriate amount if they demonstrate that their in-state programs have reduced emissions beyond the national program and in a way that does not raise allowance prices in other states.

Natural Resources Adaptation to Climate Change

We must ensure that we provide for society and for our natural resources to adapt to the ongoing impacts of climate change. We are very supportive of Title III, particularly Subtitle C, which establishes programs, plans and activities to oversee public health and natural resource adaptation in the face of climate change. However, we are concerned about the lack of an established relationship between Title III, Subpart C, which establishes a Natural Resources Adaptation Policy and Strategy for the country, and Title III Subpart D, which initiates four new funding programs for adaptation projects. We recommend that language be inserted before Section 381 that clarifies that each of the four funding programs established by Subpart D must not undermine any strategies, activities or actions within the state natural resources adaptation plans approved under Subpart C.

Furthermore, we note that the State Climate Change Response Plans approved under Section 210, which distributes auction proceeds deposited in the State Climate Change Adaptation Fund to the States for general adaptation projects, should be held to this same standard. Therefore, we recommend the inclusion of language in Section 210 that says that State Climate Change Response Plans must not undermine the state natural resource adaptation plans approved under Subpart C.

With regard to the natural resources adaptation plans required of Federal agencies and States under Subpart C, we recommend that the deadline for their development be expanded from 1 year to 18 months from enactment of the National Adaptation Strategy.

It is vital that these plans be done well, without shortcutting the agencies' duties under existing law. Good adaptation is not an "off-the-shelf item"; understanding how best to invest in it will require careful study. Investing more time up front will increase the likelihood of strong and enduring plans that agencies can confidently turn to for guidance in the future. Along these lines, it is also imperative that explicit direction be included in Subpart C that requires natural resources adaptation plans to minimize the collateral adverse environmental impacts associated with adaptation activities. Proper and careful study and clear direction to minimize collateral damage to natural resources can improve upon the natural resources adaptation plans and ultimately move us closer to achieving the goals of the National Adaptation Strategy.

Finally, we note several deficiencies regarding the Wildfire Program (Section 383) and the Coastal and Great Lakes State Adaptation Program (Section 384) under Subpart D. Section 383 as written would potentially fund a broad array of active forest management activities. Some of these activities fall outside the scope of reducing community wildfire risk, and could increase net carbon emissions and have other undesirable side effects. At a minimum, we recommend that Sec. 383 (e)(2)(E) be edited to read "Fuels reduction that reduces serious risks to homes and other structures." In the same regard, we recommend that Fire Risk Mapping activities in Sec. 383 (d)(2) be amended to apply only to "water supply systems." These suggested changes will ensure that funding associated with this program treats the real problem of reducing fire impacts within communities.

With regard to Section 384, we recognize that important environmental criteria (d)(1)(B)(i-ii) exist to safeguard against funding harmful adaptation projects, but it is essential that these safeguards apply to all actions under this program, including those referenced in (d)(1)(A). We also think it is essential that projects proposed for funding by the States under Section 384 be submitted in advance to the Administrator for review and approval. This offers some level of oversight to ensure accountability of the proposed projects with the environmental criteria contained in this subsection.

These changes, taken together, will strengthen Title III and Section 210, and will significantly increase the overall effectiveness of climate change adaptation efforts.

IV. Using Allowance Value for Public Benefit, Not Private Enrichment

The distribution of the carbon allowances is one of the fundamental decisions that Congress must make. This choice is often debated by using the shorthand "auction versus free allowance giveaway." However this shorthand misses the following important policy point: more important than whether allowances are sold at auction or distributed for free is the question of what purposes the allowance value must be used for. Congress can assure that specific public purposes are achieved either by allocating a free allowance with conditions on how its value must be used or by auctioning the allowance and directing how the proceeds must be used. While S. 1733 allocates most allowances without charge in the early years, most of those free allowances are required to be used for public purposes and an increasing number – eventually effectively all of them – are auctioned over time. Nevertheless, significant improvements can be made. Here are the most significant categories:

Consumer protection for utility customers.

S. 1733 distributes the largest fraction of allowances, at least through 2025, to electric and natural gas local distribution companies. While the bill requires LDCs to use the value of these allowances to benefit their customers, it leaves it to utility regulatory commissions to define "public benefit."

Amending this provision to require LDCs and regulators to maximize consumer benefits by promoting investment in all cost-effective energy efficiency is the single most important step Congress can take to reduce the nation's energy bill and ensure that S. 1733 reduces global warming pollution at the least possible cost. While several states and utilities have demonstrated the enormous potential of efficiency to reduce consumer energy bills, the majority have done little or nothing to capture this resource due to a host of market and regulatory barriers, and absent such a requirement there is no reason to suppose they will begin now. As a result, we will come nowhere near capturing the $1.2 trillion worth of energy savings that McKinsey & Co. has determined we can achieve by 2020 if we adopt a serious effort to redirect the nation's energy investments towards efficiency.[10]

Why are efficiency investments so important? First, residential, commercial and industrial energy consumers who install efficiency measures will enjoy that $1.2 trillion in energy bill savings. Second, all consumers benefit when we lower the nation's energy bill by investing in efficiency whenever it is cheaper than investing in power plants – the resulting overall reduction in demand for energy puts downward pressure on electricity rates, fuel prices and the cost of allowances. Third, by shifting our energy dollars from one of the least labor-intensive activities in our economy – operating power plants – towards a set of more labor-intensive activities – including retrofitting existing homes and office buildings and installing high efficiency lighting, equipment and appliances in all of them – we can create hundreds of thousands of new jobs that can never be sent overseas. .

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[10] McKinsey & Company (2009): "Unlocking Energy Efficiency in the U.S. Economy". Available for download at http://www.mckinsey.com/USenergyefficiency/

If energy efficiency is so cheap and the opportunities so prevalent, why isn't everyone already investing in it? The answer is a host of persistent market barriers such as split incentives (e.g. landlord vs tenant), high internal rates of return, and a lack of information about or access to efficient products. But the primary barrier is regulatory: we don't buy energy efficiency because no one is in the business of selling it to us and no one is in the business of selling it to us because in most states we have adopted a perverse regulatory framework that ties utility profits and the recovery of their fixed costs to sales. This makes helping their customers improve efficiency very unattractive to their shareholders, even when doing so is substantially cheaper than generating and delivering electricity and natural gas. Given this regulatory context, Congress cannot give LDCs and regulators a blank check and expect them to deliver that $1.2 trillion in energy bill savings to American consumers; it must require a hard look at efficiency as an integral part of the allocation provisions.

S. 1733 includes a host of important provisions to promote energy efficiency, but collectively they do not approach the $50 billion/year investment that McKinsey estimates is needed to capture all net present value (NPV) positive.[11] To do that it is necessary to shift LDC investments from more expensive supply resources whenever cheaper efficiency options are available. S.1733 does this for of natural gas, home heating oil and propane, directing LDCs and states to invest one-third to one-half of the value of their emissions allowances to cost-saving energy efficiency investments. Congress should do the same for electricity LDCs.

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[11] Ibid

If local electric companies invested a third of their allowances in efficiency, national energy efficiency investments would increase by about $10 billion per year. This would lower consumers' electricity bills and lower carbon allowance prices significantly for all sources.

Several states and LDCs are already investing at this level or have adopted policies and efficiency targets that will move them in this direction and Congress should make clear that current investments would count towards the one-third requirement. The policy goal is to get LDCs to invest in all cost effective efficiency opportunities, so it also makes sense to clarify that if any LDC can deliver all such opportunities by investing a smaller amount, their regulatory commission should be authorized to reduce the percentage requirement.

Low-Income Consumers.

About 15 percent of total allowances are devoted every year to protecting low-income consumers, who spend a higher percentage of their income on food, transportation, and other necessities. In its analysis of a similar provision in the House bill the Congressional Budget Office concluded that these provisions will be effective in assuring that the legislation is progressive, with the lowest income fifth of the population being better off under the bill by about $40 per year.

Preserving Domestic Competiveness.

The bill provides approximately 15 percent of total allowances to energy-intensive manufacturers of products such as steel, aluminum, cement, and chemicals that are subject to strong international competition. The rebates are intended to counter pressures to shift production, jobs, and emissions to countries without comparable carbon reduction programs. Rebates are based on an industry average emission rate (e.g., tons of CO_2 per ton of cement) and facility-specific output data (e.g., tons of cement produced) and phase out by 2035. The President can accelerate the phase-down of allowances after 2025 if he finds that other countries have acted appropriately to curb their own emissions. The bill also has broad authority for a border adjustment provision taking effect after 2020. This provision should be elaborated on as the bill moves forward. Refinements are needed to assure that firms are not overcompensated and that the competitiveness measures are applied only to the extent that other countries have not stepped up to the plate.

But preserving competitiveness should not mean creating domestic emissions loopholes through our treatment of exports. In its current form, the bill exempts producers of energy sources such as petroleum and liquid coal from holding allowances if those products are exported and combusted elsewhere. The language should clarify that only combustion emissions outside of the United States, and not domestic emissions associated with the production of that fuel, qualify for such an exemption. Any ambiguity risks opening a substantial loophole for domestic upstream emissions that are rightly covered under the program.

Oil Refiners and Merchant Coal Generators.

Oil refiners and merchant coal plants do not qualify for allowances either as LDCs or energy-intensive, trade-exposed manufacturers. Nevertheless, under S. 1733 these sources initially receive significant allowances for free. The bill contains an important provision for reducing the merchant coal allocation if EPA finds it will lead to windfall profits. The same provision to avoid windfalls should be attached to any allocation to oil refiners.

Energy efficiency and renewable energy deployment.

Section 202, Division B of the bill provides a substantial share of allowances to states, local governments, Indian tribes, and large scale renewable generation companies to promote the deployment of energy efficiency and renewable energy technologies.

The states are directed to use the allowances for programs such as building efficiency retrofits, low-income housing weatherization, thermal energy efficiency projects, and renewable energy deployment incentives. About 10 percent of the allowances allocated to states under Section 202 are to be awarded according to how well they perform in promoting energy efficiency, which is an innovative approach that will help encourage greater attention to overall efficiency performance within a state. Local governments are to use their allowances for implementing the Energy Efficiency and Conservation Block Grant Program.

State and local governments are allocated about 85 percent of the Section 202 allowances after the initial distribution to Indian tribes. EPA is to allocate the remaining 15 percent to large scale renewable energy generation companies. This renewable energy allocation, which is the only federally administered energy efficiency or renewable energy deployment allocation in the bill, is not large enough. The amount of allowances Section 202 allocates to federal efficiency and renewable energy programs should be increased to a total of about 45 percent.

Federal programs are critical for the ramp up of energy efficiency and renewable energy resources that will achieve deep global warming pollution reductions. Such programs provide the uniform incentives and national scale that manufacturers and developers need to implement major initiatives. The programs also enable more allowance value to flow to states that have significant renewable energy resource potential, but would receive relatively little funding pursuant to the state and local government allocation formulas specified by Section 202.

The allocation provided to renewable generation companies should be increased to at least 35 percent of the Section 202 allowances and the scope of the program should be expanded to include distribution scale technologies. These changes would create a program that will help scale up a range of emerging renewable energy technologies. The allowances also need to be awarded for renewable energy generation in quantities that equal a fixed price per amount of electricity generated that is established prior to a facility being placed in service. Such an incentive structure would provide greater certainty to investors and help avoid over-subsidization.

Building energy efficiency code.

The bill provides allowances to states for implementation of the building energy efficiency code provision in the bill. The provision directs EPA, or another agency designated by the President, to establish a national building energy efficiency code and gives the agency discretion to include provisions for state adoption and enforcement of the code. The allocation would provide the states funding needed for these activities, which could achieve dramatic energy savings and pollution reductions depending on what efficiency levels are specified in the national code. The bill does not currently specify these levels.

Energy efficiency and renewable energy RD&D.

The bill allocates allowances toward Energy Innovation Hubs and the Advanced Research Projects Agency – Energy (ARPA-E) for research, development and demonstration projects that reduce global warming pollution and dependence on fossil fuels. This allocation will help support the innovation that is needed to create the next generation of energy efficiency and renewable energy technologies, which is essential to achieving substantial pollution reductions.

Improved transportation planning.

The transportation sector represents nearly a third of US GHG, and the Chair's Mark appropriately increases the focus on this growing source of emissions. The legislation would set up a framework under which states and large metropolitan regions can begin to plan for transportation sector emissions reductions, and monitor progress over time. The bill would also offer states and regions a new set of tools, as well as access to federal grants, to assist them in developing and implementing low-carbon transportation plans. This approach to reducing transportation sector emissions will provide states and regions a high level of flexibility in meeting aggressive but achievable goals through local infrastructure investments.

There are several key elements of the transportation efficiency provisions of which NRDC is particularly supportive. Foremost, we are pleased to see that the Chair's Mark recognizes the importance of transportation emissions reduction with increased investment. The bill's transportation efficiency grants represent direct investment in our communities that will create jobs and reduce emissions. We are also pleased that the bill recognizes the joint role that DOT and EPA can play in overseeing transportation emissions reduction. This will ensure that states and regions have access to a wide variety of resources and assistance, leading to balanced plans that reduce emissions and enhance the convenience and affordability of local transportation. Finally, the legislation's focus on data and modeling improvements will allow states and regions maximum flexibility in reducing emissions by prioritizing the most effective strategies.

Domestic adaptation and public health programs.

Allowances are also dedicated to domestic public health and natural resources adaptation programs. Natural resources adaptation programs, along with adaptation programs for water systems, are critical to ensuring that our nation's water resources remain healthy and resilient. Climate change is predicted to damage aquatic ecosystems, infrastructure, and water supplies as it causes more frequent heavy rainfall events, intensified water pollution, longer droughts and shortages, higher water temperatures in sensitive habitats, and salt water intrusion into aquifers due to sea level rise. Adaptation programs with dedicated funding will enable federal, state, and local governments to prepare for these impacts, ensuring that communities across the country will continue to enjoy safe and adequate water resources.

S. 1733 also provides funding to develop a comprehensive action plan to help health professionals prepare for and respond to the impacts of climate change on public health. Some of these impacts include: more heat-related illnesses and premature mortality; increasing air pollution and allergens; expanding infectious diseases; increasing flood risks; mental and behavioral health impacts; and displaced communities. Public health preparedness is strengthened by measures to target, prioritize and protect the most vulnerable communities.

Funding for additional agriculture and forestry activities.

S. 1733 contains a new section 155 that seeks to find additional climate benefits in the agriculture and forestry sectors. New funding to advance section 155 would come from allowance auctions, as directed by section 214. NRDC supports maximizing the contribution of agriculture and forestry sectors to the overall goal of climate mitigation. As the bill moves forward, section 155 will need refinement to assure that outcome.

Essential to ensuring additionality at the programmatic level and effective use of auction proceeds will be clarifying that none of section 155 applies to projects that receive offsets or would otherwise occur anyway. Subsections (a)(3)(A) – (C) by their terms create eligibility only for projects that are not offset-eligible. However, subsections (a)(3)(D) – (F) lack such an explicit proviso. Moreover, none of subsection (a)(3) has an express programmatic additionality design objective, raising the possibility that business as usual practices could be eligible. Subsection (a)(3)(C), for instance, could pay for non-till practices that would be adequately incentivized by the marketplace. These potential weaknesses would be largely addressed by strengthening subsection (a)(4) to rule out, explicitly, support for projects that would likely occur, or have occurred, without that support.

Section 155 as currently drafted is also so broadly applicable that some care will be needed to ensure it does not incentivize serious collateral environmental damage or overall emission increases. Sensitive lands should be protected by incorporating standards utilized for sustainable biomass production in section 102 of the bill (creating a subsection 700(46) for Title VII of the Clean Air Act).

Similarly, section 155's anti-reversal protections, found in subsection (a)(8), need to be tightened to cover projected carbon losses after the contract or easement term. This is in part a concern because as drafted the section would support forest thinning operations. The best available science indicates that most and maybe all forest thinning, whatever its merits from other perspectives, results in net carbon emissions.[12] Thus, for instance, if thinning were successful in reducing near-term intense fire emissions, it would also – fire ecologists tell us – initiate a long-term regime of less intense but much more frequent ground fires that collectively emit more carbon than one large burn. Section 155 should not promote net carbon emissions. Editing subsection (a)(8) as suggested above will help ensure against that, as will dropping the current gaping exclusion from subsection (a)(4)'s additionality requirement for "activities that provide adaptation benefits."

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[12] Net emissions are likely even accounting for the oil-displacement potential of the resulting biomass. *See* Mitchell, R.M., M.E. Harmon, and K.E.B. O'Connell. 2009. *Forest fuel reduction alters fire severity and long-term carbon storage in three Pacific Northwest ecosystems.* Ecological Applications, 19(3): 643-655.

Green jobs and worker transition.

S. 1733 creates a program of worker training, education, and transition for clean energy jobs. It also provides transition assistance to qualifying workers who may be displaced by the effects of the legislation.

International objectives.

A critical portion of the S. 1733 allowances is devoted to international objectives, including reducing deforestation, helping the most vulnerable countries adapt to climate change impacts, and promoting clean technology exports. NRDC urges this Committee not only to include these allocations for international purposes, but to enlarge them. The 5 percent of allowances dedicated to reducing tropical forest loss is one of the key provisions of S. 1733, simultaneously tackling the devastating loss of forests and helping to demonstrate that the U.S. is taking action on a scale comparable to other developed countries. NRDC joined in supporting this deforestation allocation with a strong coalition of business, environmental, and conservation groups including American Electric Power, Environmental Defense Fund, Duke Energy, the Sierra Club and others. Even greater support has recently emerged from a bipartisan group of leaders from business, government, advocacy, conservation, global development, science and national security – the Commission on Climate and Tropical Forests.[13]

S. 1733 importantly increases the allocations for helping the poorest countries cope with unavoidable climate impacts. We urge the Committee to retain and expand the allocation to promote market opportunities for U.S. clean technology. These provisions are in our national interest. Global warming impacts can significantly increase threats to our national security. These allocations are critical to U.S. credibility and engagement with other countries providing our climate negotiators with important tools to secure strong international commitments as Special Climate Envoy Todd Stern stressed in his recent testimony before the House.[14] The clean energy export provision also provides an important tool to help secure a strong commitment from all major emitters as they are made available only to countries that take significant action to reduce their pollution. At the same time, this provision helps create and support the demand for U.S. clean energy technologies, thereby further expanding the benefits of this bill to American workers and companies.

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[13] Specifically the Commission called for public sector investments to increase gradually to $5 billion annually by 2020 to unlock the cost savings of deforestation offsets and reduce deforestation in nations that cannot attract private capital. This is an amount roughly equivalent to that produced through the deforestation set aside in H.R. 2454 and in S. 1733. For more information on the Commission see: http://www.climateforestscommission.org/

V. Market Risks from Subprime Offsets and Biofuels

NRDC supports the development of offset and bioenergy incentives but it is critical that these provisions be designed to assure positive environmental outcomes. As I testified to this Committee in July, NRDC believes that the agricultural offsets and bioenergy provisions incorporated into in the House bill would create grave threats of negative environmental outcomes for both of these programs. The changes made in the House bill run the risk of creating a subprime market in both offsets and biofuels. They seriously damage the environmental integrity of the bill, and they will undermine public confidence in the markets for both products. S. 1733 addresses some of our concerns but it leaves a number of important domestic agriculture offset rules undefined and fails to close a huge loophole in how bioenergy emissions are accounted. Improvements to these provisions are needed as the bill proceeds through the Senate.

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[14] Testimony available here: http://globalwarming.house.gov/files/HRG/091009Roadmap/stern.pdf.

Fixing the offset rules

S. 1733 allows a very large number of offset credits – up to two billion tons per year. Domestic offset credits can be earned by reducing or sequestering emissions from agricultural sources and smaller industrial sources that are not subject to the emissions cap. International offset credits can be earned by reducing rates of deforestation, as well as by measures taken in the electricity and industrial sectors, and agricultural, and reforestation sectors if certain thresholds are met. In order to turn offset use into an engine for making net reductions in carbon pollution, S. 1733 provides that capped sources acquire 1.25 tons of reductions or sequestrations from international offsets for each ton of extra emissions they wished to emit. Thus, with every international offset transaction, net global emissions were to be reduced by a quarter of a ton of CO_2. In this way, using international offsets would not merely let us run in place. Rather, the more international offsets we use, the faster we would make progress reducing overall emissions. This is a win-win: while offset users would benefit from reduced compliance costs, the world would benefit from additional emission reductions.

A key design objective for any offset program is to assure the *quality* of all offsets as this is essential to the integrity of any carbon pollution reduction targets. If an offset credit is not backed by a real reduction, or if that reduction would have happened anyway, then total system emissions actually increase above required levels when that credit is used to enable a capped source to emit an extra ton of carbon.

Ensuring offset quality through the development and implementation of sound rules should be in the common interest of business, environmentalists, farmers, foresters, ranchers, and the American public. Otherwise, we run the risk of creating a subprime asset. If offsets do not actually reduce emissions as promised, they will quickly lose public trust and support. The loss of public trust will penalize the good actors by reducing confidence in the offset market, while simultaneously damaging our environment. That result isn't in the interest of anyone. As we have seen in the financial markets, loss of confidence in market instruments can have broad and costly ripple effects.

It is no secret that poor offset quality has been a serious problem in implementation of the Clean Development Mechanism under the Kyoto Protocol. That is why S. 1733 focuses attention on creating a reliable framework for ensuring the reality and additionality of each ton of reductions or sequestrations claimed under an offsets program.

First, S. 1733 establishes a science-driven process for developing the offset system's rules by creating an Offsets Integrity Advisory Board consisting of experts with the relevant backgrounds and experience, drawn from public, private sector, and university settings. This Board is critical to ensure that regulators are given strong, independent, and scientifically driven guidance on the rules.

Second, it is important that a single agency is responsible for operating the offset system, ensuring that the environmental integrity of the system is upheld and that the rules are applied in a uniform manner across different offset types. EPA has responsibility for the overall system of compliance with the emissions cap and it is important that Congress places primary responsibility for ensuring offset quality in EPA. Since offsets are alternate compliance instruments, the agency Congress charges with assuring overall compliance with the cap should bear primary responsibility for determining the quality of offsets that will accepted for compliance purposes. However, we do support robust provisions to assure an substantial role for USDA on aspects of the domestic agriculture and forestry systems. We need to retain strong environmental oversight while assuring that USDA's expertise is brought to bear on relevant program design issues. S. 1733 leaves open the question of how this objective will be resolved.

Third S. 1733 requires that offset credits be based on standardized performance-based methodologies, rather than case-by-case reviews that have proved so problematic under the Clean Development Mechanism.

Fourth, S. 1733 requires independent third-parties to play an essential role in certifying that offset projects meet the quality standards established by the regulator.

Fifth, S. 1733 provides for random audits of projects and mandated a full program review every five years, as well as the creation of a new Office of Offset Integrity to oversee investigations into offset quality.

Lastly, S. 1733 provides for implementation of the international offsets program in a manner that creates strong guidance to the implementing agencies to: ensure that these offsets produce a net environmental outcome by requiring that countries take action on their own before they can sell offsets into the US carbon market; send a clear signal that offsets can only be generated for major emissions sources if the entire emissions within a sector are reduced; and design the other rules to avoid the mistakes of the Clean Development Mechanism. In addition to ensuring that these offsets produce a net environmental outcome, properly designed international offsets can also serve as an important lever to secure stronger commitments from major emerging economies. The combination of rules that encourage net emissions reductions and clear rules for gaining access to the US carbon market can then be used as a tool to encourage greater action from others that help reduce overall global emissions.

One constructive provision included in the House bill, which S. 1733 expands (the Supplemental Agriculture, Renewable Energy, and Forestry Fund), is for a domestic program administered by USDA to provide incentives, outside the offsets program, for supplemental farm-based emission reductions and carbon sequestration. This program provides an avenue to encourage practices that are beneficial but would have difficulty demonstrating, on a project by project basis, that the strict measurement, verification, and additionality requirements needed for offsets would be met. This concept provides a leading role for USDA in promoting farm-based practices to reduce emissions and store carbon without presenting any risk to compliance with the cap. We look forward to working with other Committees and Members to ensure that the rules for this provision are designed in a manner to support beneficial agriculture and forestry activities.

Well-designed domestic agriculture and forestry projects can play an important role in solving global warming, and so we look forward to working with all Members to ensure that agriculture and forestry offset provisions are designed to create an offset system which preserves environmental integrity and secures the public trust..

Appropriate treatment of bioenergy

Sustainably produced biomass feedstocks, processed efficiently and used in efficient vehicles or burned to generate electricity, can reduce our dependence on fossil fuels, cut emissions of heat-trapping carbon dioxide, and contribute significantly to a vibrant rural economy. Based on its potential, bioenergy has benefited from tremendous public investment in the form of production mandates and tax dollars.

Pursued without adequate environmental safeguards, however, bioenergy production can damage in significant ways our lands, forests, water, wildlife, public health and climate. There are three critical legs to the stool of a sustainable biofuels policy that will help avoid these unintended consequences.

1) Climate policy must recognize biofuel and bioenergy emissions;

2) EPA must consider indirect land use change when administering the Renewable Fuel Standard; and

3) Biomass sourcing safeguards that protect federal forests, sensitive ecosystems, and wildlife habitat must be preserved.

S. 1733 properly maintains the latter two legs of this stool, but leaves the first critical issue – biomass emissions accounting – unaddressed. Without all three legs in place, ramped up biofuels production would significantly undermine the achievement of the carbon pollution reduction targets in climate and energy legislation, harm on our natural resources, and undermine the market for bioenergy.

Climate Policy Must Recognize Biofuel and Bioenergy Emissions

Both S. 1733 and the House bill contain a large biomass loophole in carbon accounting by ignoring the global warming emissions related to biomass production and combustion when determining if the bills' emissions caps are met. The loophole could dramatically diminish the emission reductions achieved by these bills, undermining actual reductions in 2020 achieved by capped sources by as much as 6 percentage points.[15]

Getting the accounting wrong means that more CO2 is going into the air than is being acknowledged; and that worsens global warming. The atmosphere doesn't care if CO2 came from burning coal, burning trees, or grasslands plowed up because of expanded biofuels production. It all has the same effect whether we count it or not but we can't reduce emissions that we don't admit are happening. Global warming is too serious a problem for us to use incomplete balance sheets.

The loophole is created by not requiring covered sources to account for the life-cycle emissions of biomass and biofuels. In other words, if a coal power plant replaces half of its coal with biomass, under the bill as written it is required to hold carbon allowances for only half of its carbon emissions. This makes sense only on the assumption that 100 percent of the carbon dioxide released when the biomass is burned was taken up from the atmosphere during its production. That assumption is true when biomass is grown in a sustainable, low-carbon manner. It is not true if biomass is taken from long-established forests or using other practices that result in large releases of sequestered carbon into the atmosphere before the fuel reaches the power plant.

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[15] Drawing on several independent scientific analyses, NRDC estimates that under H.R. 2454 uncounted bioenergy emissions in 2020 could be 45-354 million metric tons greater than in 2005. Our best estimate is 193 million metric tons, based on results of a preliminary analysis of H.R. 2454 using a version of the Department of Energy's NEMS model and land-use-related emission factors from EPA's RFS2 proposal. This would erode the effective 2020 emission reductions to only 14 percent using our best estimate, and to as little as 11 percent using the high end of the scientific range.

A group of prominent ecologists and climate scientists underscored the importance of this issue in a study that recently was published in the journal *Science*, writing,

> This accounting erroneously treats all bioenergy as carbon neutral regardless of the source of the biomass, which may cause large differences in net emissions. For example, the clearing of long-established forests to burn wood or to grow energy crops is counted as a 100% reduction in energy emissions despite causing large releases of carbon.... The potential of bioenergy to reduce greenhouse gas emissions inherently depends on the source of the biomass and its net land-use effects.[16]

The article goes on to warn that this accounting error, if applied globally, "could displace 59% of the world's natural forest cover."[17] And finally, it concludes that,

> Under any crediting system, credits must reflect net changes in carbon stocks, emissions of non-CO2 greenhouse gases, and leakage emissions resulting from changes in land-use activities to replace crops or timber diverted to bioenergy (*1*).[18]

A rational, environmentally sound market for bioenergy would account for upstream carbon emissions. The marketplace would then favor sustainable, low-carbon sources of biomass, and shun those that make our climate problem worse. The biomass loophole will encourage ineffective "junk" biomass, disadvantaging and punishing providers of sound biomass. It also punishes providers of other low-carbon energy – wind and solar, for example – and even hurts providers of fossil energy who have to incur the cost of carbon allowances, while no allowances would be required if the source switched to bioenergy.

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[16] Searchinger et al, *Fixing a Critical Climate Accounting Error* Science, Vol 326, p. 527-528 (October 23, 2009).
[17] Ibid
[18] Ibid

Fortunately, in the other body, Chairmen Waxman and Peterson recognized in a letter that this issue must be addressed.[19] The common sense solution is to close the loophole now by ensuring that covered entities that burn or process biomass report the full net carbon impacts of that fuel, capturing net emissions reduction benefits from the most sound biomass sources and accounting for emissions increases associated with other types of biomass.

We have to get biofuels right to get the pollution reductions the clean energy bill is designed to achieve. Full carbon accounting for biomass is essential to this goal. Without it, bioenergy production will incentivize forest clearing and other land use that not only reduce climate benefits but could actually increase net emissions higher than continuing to burn fossil fuels.

EPA must consider indirect land use change when administering the Renewable Fuel Standard.

We applaud the decision to preserve current law regarding full life-cycle accounting in carrying out the renewable fuel standard.

As this Committee is well aware, the expanded RFS mandate established in EISA 2007 included life-cycle greenhouse gas performance requirements for new biofuels. EISA's amendments to the Clean Air Act required EPA to conduct a full life-cycle analysis of emissions associated with producing biofuels – including the emissions from market driven impacts like deforestation and land conversion in other countries. The amendments specifically defined life-cycle emissions to include "direct and significant indirect emissions such as significant emissions from land-use changes." Upholding this provision as S. 1733 does is essential to getting biofuels right.

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[19] Letter from Chairmen Waxman and Peterson to Speaker Nancy Pelosi (June 24, 2009).

Emissions from market-driven deforestation and land use change are large. In the California Air Resources Board's adopted rule and in EPA's proposed RFS rule, expert agencies have found that the emissions from the biomass-generated incentive for clearing land equal between 31 percent and 66 percent of the life-cycle greenhouse gas emissions of gasoline.[20]

As the USDA stated in recent testimony to Congress: "There is little question that increased biofuel production will have effects on land use in the United States and the rest of the world."[21] The USDA testimony also noted: "EPA's proposal reflects considerable input, guidance, and data from USDA. EPA's proposal also utilized many of the same data and assumptions that USDA uses regularly in near-term forecasting agricultural product supply, demand, and pricing."[22]

Ignoring market-driven emissions from land-use change in other countries would allow world-wide emissions to increase as carbon is released from forests and soils, worsening global warming instead of abating it. To be sure, calculation of the emissions associated with market-driven land-use changes is complex. But a sound scientific basis already exists for these calculations. EPA is tasked with using the best science and peer-reviewing its proposal.

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[20] California Air Resources Board (CARB), "Staff Report: proposed Regulation to Implement the Low Carbon Fuel Standard - Initial Statement of Reasons (ISOR), Volume 1," March 5, 2009. Table IV-5, p. IV-15 and Regulation of Fuels and Fuel Additives: Changes to Renewable Fuel Standard Program (Notice of Proposed Rulemaking). Federal Register 74:99 (May 26, 2009) p. 25041.

[21] USDA, Statement of Joseph Glauber, Chief Economist, U.S. Department of Agriculture Before The House Agriculture Committee, Subcommittee on Conservation, Credit, Energy, and Research, May 6, 2009, Pg. 15.

[22] *Id.* at 2.

In fact, EPA is relying on the same peer-reviewed models that Congress has relied on for years to assess the impacts of the farm bill. These are the same models the corn ethanol industry has pointed to arguing that ethanol subsidies are good because they raise the price of corn and thus lower agricultural subsidies. The main difference in how EPA is using these models is that it is including the economic ripple effect that those higher corn and crop prices have around the world. If these models are good enough to make the case for ethanol subsidies, it is difficult to argue they are not good enough to assure that ethanol actually provides emissions benefits in return for those subsidies.

Addressing this issue, more than 170 scientists wrote to the California Air Resources Board saying:

> As scientists and economists with relevant expertise, we are writing to recommend that you include indirect land use change in the lifecycle analyses of heat-trapping emissions from biofuels and other transportation fuels. This policy will encourage development of sustainable, low-carbon fuels that avoid conflict with food and minimize harmful environmental impacts.[23]

NRDC believes if EISA's requirement for full life-cycle analysis were postponed, then it would be necessary to delay further implementation of the Renewable Fuel Standard as well. If a "time-out" is called, it should extend to all the players on the field, including a time-out for all increased volume requirements under the RFS. Anything less than keeping the accounting and the volume requirements on the same schedule amounts to cooking the books.

Preserving Land and Wildlife Safeguards

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[23] Matson et al., letter to Mary Nichols, Chair, California Air Resources Board (Apr. 21, 2009).

Through its definition of renewable biomass, S. 1733 includes important biomass sourcing guidelines. This third leg of the biofuels policy stool is critical for two reasons. First, it is essential to protecting sensitive federal forests and other important ecosystems and wildlife habitat from unsustainable biomass harvesting. Second, it acts as an additional backstop against increased carbon emissions by directing biomass sourcing away from high-carbon ecosystems and towards low-carbon sources.

Safeguards like those included in S. 1733 help to provide vital protections for wildlife, native grasslands, old-growth, natural forests, and federal forests, while making available a wide range of high-volume biomass materials, assuring diverse opportunities for landowner participation and a wide diversity of feedstocks. These types of minimum safeguards should be retained for all policies that promote bioenergy. In contrast, proposals to use only the portion of the Farm Bill's criteria for eligible biomass that does not include any sourcing safeguards should be rejected.[24] Part of getting biofuels right is ensuring biomass programs do not lead to plowing up grasslands, deforestation, or loss of important wildlife habitat.

The definition of renewable biomass in S. 1733 helps protect against the bill's significant incentives for bioenergy from encouraging the destruction of sensitive wildlife habitat, and also protects against the loss of native grasslands and old-growth and late successional forest. The protected ecosystems are home to many of our most threatened, and imperiled wildlife.

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[24] It is important to recognize that the Farm Bill definition of renewable biomass contained in the 2008 Farm Bill Energy Title contains no sourcing safeguards on non-federal lands and was not designed to provide sourcing guidelines for fuel and electricity mandates. The only Farm Bill Energy Title program designed to incent biomass for energy production, the Biomass Crop Assistance Program, contains its own set of eligibility criteria to promote sustainability. These criteria include a prohibition on all food crops, as well as protections against conversion and other environmental impacts. The very fact that different programs in the Farm Bill include their own set of criteria designed to meet the goals of that specific program indicates that extracting only the Farm Bill definition and applying it as a sourcing guideline makes little sense.

The bill's definition also properly discourages the conversion of natural forests to other uses. These forests are under severe threat from unsustainable logging practices, global warming, and real estate development. While outright deforestation is the most dramatic example, equally critical is the conversion of natural forests to single-species tree plantations. Plantations may look like "forests," but they are biological deserts compared to the natural forests they replace – lacking the carbon content, diversity of species, structure, and ecological functions that make natural forests so important. While tree plantations and young forests are increasing in parts of the United States, older forests that provide critical wildlife habitat and store tremendous amounts of carbon are disappearing faster than they are being re-grown, both nationally and globally. Loss of native habitat is the greatest threat to biodiversity here and abroad. Loss of forests is one of the greatest threats to biodiversity worldwide and a huge contributor to global warming.[25]

The sourcing safeguards also protect critical areas on our federal forests. Federal lands are held in trust for the American public. Freed from immediate market pressures, their core purpose is a set of values and services largely unavailable from private lands. In the climate context, their highest functions are as carbon sinks, measures of U.S. credibility globally, and ecological refuges. Additionally, these forests represent unique reservoirs of genetic and other biologic diversity, provide many other ecological services like drinking water and flood control, and stand to play a critical role in the face of global warming's growing impacts on biodiversity, ecosystem resilience, and the spread of invasive species.[26]

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[25] Intergovernmental Panel on Climate Change, *Climate Change 2007: Synthesis Report Summary for Policymakers*, pg. 5. Available at http://www.ipcc.ch/pdf/assessment_report/ar4/syr/ar4_syr_spm.pdf

Old growth forests and native grasslands store vast amounts of carbon. Most private and many state lands are managed with an intensity that greatly reduces carbon sequestration. United States national forests and Department of Interior lands are the exception. Their undisturbed areas can be kept intact; those damaged can be guided back to carbon-rich status. No other land use decision within Congress' direct control has so much potential to mitigate global warming.

Some logging enthusiasts optimistically argue that restoration of federal lands is actually enhanced by opening them to biomass sourcing. However, it has proven very difficult to create biomass incentives for these lands that provide reliable greenhouse gas benefits but do not jeopardize their core functions and values. Generally, the more wood removed, the greater the adverse impact on net sequestration and ecologic functioning. Thus, while light thinning may in some cases help remedy past abuses, allowing industrial demand to drive restoration decisions is a recipe for disaster. Not only does industrial sourcing damage natural forest values, the best available science indicates that most and maybe all forest thinning results in net carbon emissions.[27]

Conservation of these public lands is also essential to our ability to persuade other nations to protect their forests. Climate change cannot be managed without halting native forest loss worldwide. To press that point credibly, we must practice what we preach. Putting our own house in order requires preserving intact federal forests and increasing the carbon storage of others.

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[26] See, for example, Lovejoy, Thomas, *Climate Change and Biodiversity*, Yale University Press, August 2006.
[27] *See* note 12, above.

These public lands are also vital to climate adaptation. Large undisturbed tracts, like national forest roadless areas, enjoy high ecological health. They are better positioned than altered systems to accommodate warming with their essential processes in place. As America's flora and fauna suffer the stress of climate change, these are the landscapes in which many can best survive. Intact public lands will preserve our natural heritage and biological diversity, and thereby help lessen pressure on private lands.

In sum, in order to get biofuels right it is critical that all three legs of the biofuels stool be upheld. Removing any legs of the biofuels policy stool fundamentally threatens the foundation of sound bioenergy policy by pitting environmental objectives and bioenergy production objectives against each other. NRDC and many other environmental organizations have championed bioenergy in the past and NRDC wishes to continue to support this potentially clean and sustainable source of energy. However, if bioenergy is sourced and produced in a manner that irreconcilably conflicts with solving global warming and safeguarding natural resources, the basis for such support will be destroyed.

In order to capture the potential of clean biofuels and ensure the full carbon reduction goals of climate legislation are met, the biomass emissions loophole needs to be addressed and floor amendments like those included in the House bill must be rejected so that American agriculture may reap the benefits of bioenergy without damaging our natural resources and worsening climate change.

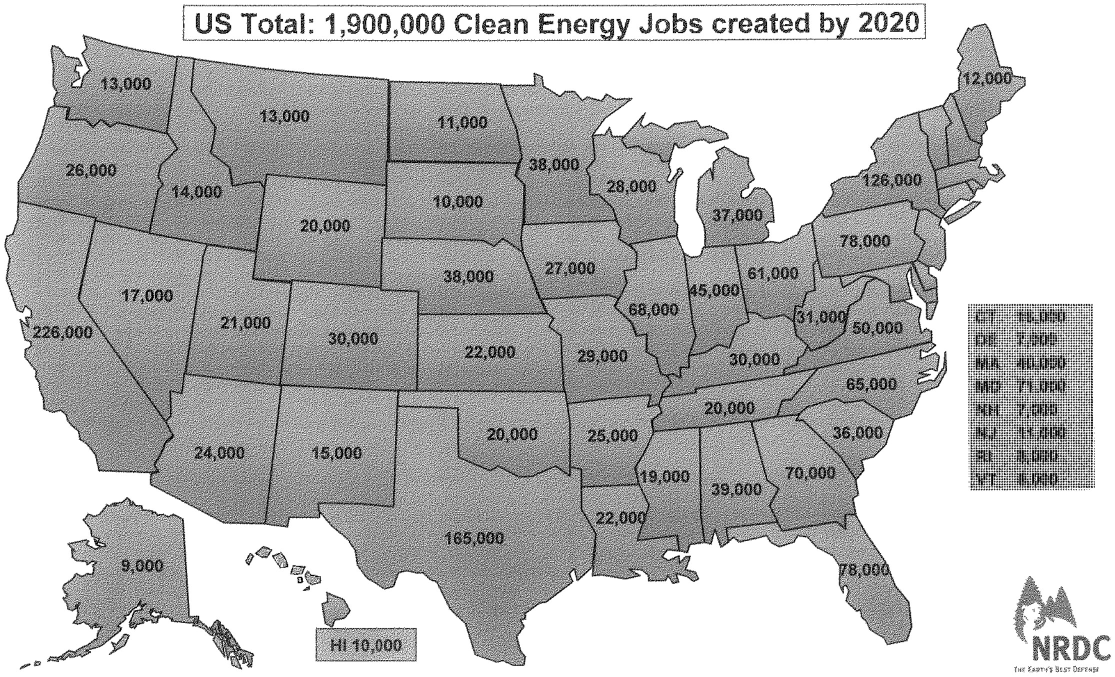
VI. Conclusion

Chairwoman Boxer and members of the Committee, the time for action to address the triple threat of overdependence on insecure energy resources, a weakened economy, and an imperiled climate is long overdue. S. 1733 has the right broad architecture: a comprehensive limit on greenhouse gases that gets tighter over time, a set of complementary policies to spur rapid improvements in emission performance in key sectors of the economy, a balanced approach to allowance value distribution that addresses the different transition challenges for different regions and economic sectors and provides needed resources for clean energy deployment, well-designed provisions to manage program costs without weakening the program's environmental performance, and modest but important support for forest protection in other countries. We urge the Committee to report this bill, with the improvements we have suggested, to the full Senate. While time is obviously short, with prompt action a bill to secure a beneficial economic, energy and climate future could still be presented to the President for his signature this year.

Clean Energy Investments Create More Jobs

Comprehensive clean energy and climate protection legislation, like the American Clean Energy and Security Act (H.R. 2454) and the Clean Energy Jobs and American Power Act (S. 1733), would strengthen the U.S. economy by establishing pollution limits and incentives that together will drive large-scale investments in clean energy and energy efficiency. These investments will result in stronger job growth, higher real household income, and increased economic output than the U.S. would experience without the bill. New analysis by the University of California shows conclusively that climate policy will strengthen the economies of every state, and the U.S. as a whole, and that it would create between 918,000 (moderate-efficiency case) and 1.9 million (high-efficiency case) more jobs by 2020 than what the U.S. would see in the absence of such legislation. This maps presents the results from the high-efficiency case.

US Total: 1,900,000 Clean Energy Jobs created by 2020



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THE EARTH'S BEST DEFENSE

Analysis

The figure presented is based on collaborative research by the University of California, University of Illinois, and Yale University to study the detailed economic impacts of comprehensive clean energy and climate protection legislation, like the American Clean Energy and Security Act and the Clean Energy Jobs and American Power Act, on the U.S. and each of the 50 states.

The economic assessment was conducted using EAGLE, a new state-of-the-art forecasting model, which details patterns of supply, demand, employment, incomes, resource allocation, energy use, and emissions across the nation and within each of the 50 United States. Using a general equilibrium framework, the model captures both direct impacts and the extensive economy-wide indirect effects of climate and energy policies.

For more information on the model and methodology, please see: http://are.berkeley.edu/~dwrh/CERES_Web/Docs/ES_DRHFK091024.pdf

Notes:

- Employment is measured as average full-time equivalent (FTE) labor force participation per year. This means a single full-time job or two half-time jobs (people) are both counted as one FTE job.
- By reducing our dependence on imported energy, comprehensive clean energy and climate protection legislation will free us to commit more of our resources to domestic job creation while reducing our vulnerability to volatile oil prices, climate damage, and other threats to our national security. Moving from dirty to clean sources of energy will unleash a wave of more efficient technologies and drive innovation that will create new industries.
- The cost reductions driven by such legislation will boost our economy. The reason is simple: energy efficiency reduces costs for transportation and energy and thereby saves households and businesses money -- money they can spend on domestic goods and services, which will create jobs for Americans. For example, over the last thirty years, California reduced its per capita electricity consumption to 40% below the national average. This saved households $56 billion, and those savings created 1.5 million additional jobs in California.
- The EAGLE findings are consistent with previous analyses that have similarly demonstrated that clean energy investments create more jobs, across a wider variety of skill and education levels, than comparable investments in fossil-fuel energy sources. The Political Economy Research Institute (PERI) estimated in June 2009 that the combined effects of the American Reinvestment and Recovery Act ('Stimulus Bill') and ACES would yield a near-term net increase of 1.7 million jobs, based on a $150 billion shift in annual investment from traditional to clean energy.[1] While the PERI analysis focuses on the near-term effect of such legislation, EAGLE was used to analyze the longer-term impact.
- Results from both EAGLE and PERI are consistent with studies done by U.S. government agencies – such as the Environmental Protection Agency, Congressional Budget Office, and the Department of Energy – that show strong economic growth with comprehensive energy and climate legislation, especially when combined with strong energy efficiency policies.
- For the EAGLE modeling effort, two scenarios were developed: a moderate-efficiency case and a high-efficiency case. The moderate-efficiency case reflects faithful, but not aggressive, implementation of the energy efficiency standards and incentives in ACES, and assumes moderate rates of innovation in response to these policies. The high efficiency case indicates the potential for greater economic gains from more aggressive implementation of the efficiency provisions of ACES at the federal level, and adoption of supportive policies by most states. The rate of energy productivity improvements in the high-efficiency case are consistent with results that have been achieved by states that historically have had the most successful energy efficiency policies.[2] A recent McKinsey & Company study on energy efficiency potential in the U.S. found that there are enough cost-efficient energy efficiency opportunities in order to achieve these levels of efficiency improvement by 2020, all at a positive return.[3]

Footnotes:

[1] Political Economy Research Institute: "The Economic Benefits of Investing in Clean Energy", downloadable from http://www.americanprogress.org/issues/2009/06/clean_energy.html.

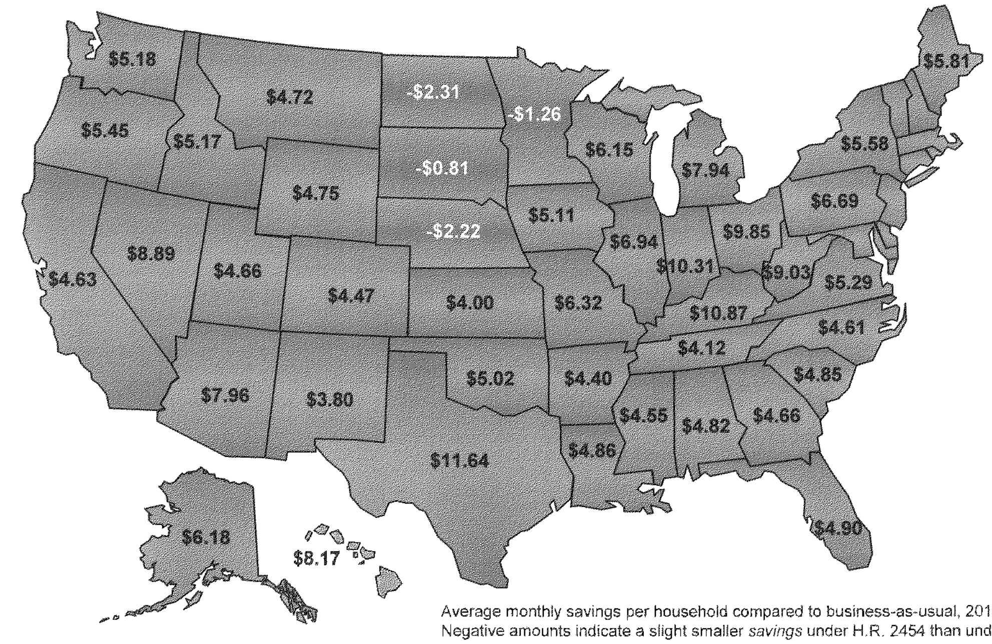
[2] For example, California achieved an aggregate increase in energy efficiency averaging 1.4% per year from 1972 to 2002. The high-efficiency case assumes that energy efficiency improves at a rate of 1.5% per year, compared to 0.75% per year in the moderate-efficiency case.

[3] McKinsey & Company: "Unlocking Energy Efficiency Potential in the U.S.", downloadable from http://www.mckinsey.com/clientservice/electricpowernaturalgas/US_energy_efficiency/.

Climate Bill Cuts Electricity Bills

H.R. 2454 saves Americans an average of $6 per month

Americans in nearly every state will save on their monthly electricity bill under the American Clean Energy and Security Act. With its energy-efficiency and consumer protection provisions, H.R. 2454 creates modest savings for most consumers. Even in the few states where savings compared to business-as-usual are not projected, bills still will be lower under H.R. 2454 than they were in 2007.



US Average Savings: $5.99/month

CT	$8.11
DC	$4.06
DE	$9.01
MA	$5.53
MD	$8.07
NH	$5.82
NJ	$6.28
RI	$4.45
VT	$5.27

Average monthly savings per household compared to business-as-usual, 2012-2020. Negative amounts indicate a slight smaller *savings* under H.R. 2454 than under business-as-usual. Methodology and sources on back.

NRDC

Methodology and Sources

The data presented are based on analysis that NRDC commissioned from OnLocation Inc., using NEMS-NRDC. NEMS was developed by the U.S. Department of Energy, and is the model that the Energy Information Administration (EIA) uses to develop its Annual Energy Outlook. OnLocation has extensive experience with the NEMS model, and has provided NEMS model development and support to EIA for over 20 years. For this project OnLocation analyzed H.R. 2454 using a modified version of the model, which is referred to as NEMS-NRDC. NEMS-NRDC portrays the effects of H.R. 2454, including carbon price projections, energy efficiency improvements (represented by adopting EIA's High Technology case assumptions), allocations to local distribution companies (LDCs), and dynamic responses (e.g., demand reductions and fuel switching to lower carbon fuels). The bill's refunds to low-income consumers are not included in the results presented here. The NEMS model generates results resolved to the regional, not the state level. NRDC further focused the results to the state level by assuming each state's electricity prices and consumption would change by the same percentage as those of the region in which the state is located, and its population would change by the same percentage as the overall U.S. population. As variation may occur between state and regional and state and national trends, these results should be considered approximate.

Details:

- Electricity bill savings (or costs) are the difference in residential electricity expenditures (price multiplied by consumption) between the Business-as-usual (BAU) and H.R. 2454 cases, per household. Changes in expenditures on energy-using devices are not included.
- Business-as-usual state-specific electricity prices and consumption levels are projected to 2020 by scaling state-specific 2007 data in proportion to changes in the electricity prices and consumption levels of the region in which the state is located. [Sources: 2007 state data from EIA. Projected electricity prices and consumption levels of each region from NRDC-NEMS Reference case based on AEO2009.]
- The percentage changes in electricity prices and consumption levels per state under H.R. 2454 are assumed to be the same as the percentage changes in electricity prices and consumption levels of the region in which the state is located. [Sources: Projected changes in electricity prices and consumption levels of each region from NEMS-NRDC modeling of H.R. 2454.]
- State-specific number of households is projected to 2020 using 2000 state-specific data scaled in proportion to the projected change in the national total [Sources: 2000 data from U.S. Census. Projected growth in number of households in total U.S. from EIA.]
- Regions are based on the NERC regions and sub-regions that EIA uses in AEO 2009. If a state falls into more than one region then its projections are calculated through taking a population-based weighted average of the two or more regions into which it falls.
- Four states experience modest bill increases relative to the business-as-usual case despite electricity prices that are projected to be below 2007 levels under H.R.2454. In the region that all four states are in, electricity prices are projected to drop by 14.6% between 2007 and 2020 under BAU and by 2.6% under H.R. 2454.

Sources used are: NEMS-NRDC modeling of H.R. 2454 (built upon AEO 2009). Department of Energy's Energy Information Administration. U.S. Census Bureau.

For more information, please contact Antonia Herzog at aherzog@nrdc.org

Questions from:

Senator Bernard Sanders

1. Do you support including a cost-effective, flexible energy efficiency investment requirement for the electric utility allocation, similar to what was required for the natural gas allocation?

A. Yes. Amending S. 1733 to include this requirement is the single most important step Congress can take to reduce the nation's energy bill and ensure that S. 1733 reduces global warming pollution at the least possible cost. According to a recent analysis by McKinsey & Co.,[1] a serious effort to redirect the nation's energy investments towards efficiency would deliver $1.2 trillion in energy savings while creating 600,000-900,000 new clean energy jobs. While several states and utilities have demonstrated the enormous potential of efficiency to reduce consumer energy bills and put downward pressure on electricity, fuel and carbon allowance prices, the majority have done little or nothing to capture this resource due to a host of market and regulatory barriers. Absent a requirement to invest in cost-effective energy efficiency, Congress cannot reasonably expect the utilities to do so. We strongly urge the EPW Committee to include this provision. Please refer to pp. 23-26 of my testimony for a more detailed discussion of this issue.

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[1] McKinsey & Company (2009): "Unlocking Energy Efficiency in the U.S. Economy". Available for download at http://www.mckinsey.com/USenergyefficiency/

Senator Sheldon Whitehouse

1) The Clean Air Act in its current form authorizes EPA to regulate criteria pollutants and hazardous air pollutants, so as to require additional reductions of the emission of these pollutants from coal-fired electric utilities. Given this, what do you believe would be the effect of passing legislation like the 3Ps proposal? How does this proposal impact EPA's authority to regulate pollutants from coal-fired electric utilities?

A. We are aware of proposals to consider updates of earlier versions of so-called "3 pollutant" or "3P" legislation addressing emissions of sulfur dioxide (SO_2), nitrogen oxides (NO_x) and mercury from fossil fuel-fired electric utility steam generating units ("EGUs"), as well as other hazardous air pollutants ("HAPs') emitted by EGUs.

As the question notes, the Clean Air Act already provides authority for EPA to regulate SO_2 and NO_x emissions (criteria pollutants) and all HAPs (including mercury) from EGUs. EPA is currently facing two general categories of legal responsibilities under current law to regulate these pollutants from EGUs.

First, with respect to SO_2 and NO_x emissions from EGUs: (1) an interstate air pollution transport rule covering SO_2 and NO_x emissions from EGUs in the eastern half of the U.S. to replace the Clean Air Interstate Rule ("CAIR") remanded to EPA by the D.C. Circuit in late 2008; (2) regulations to implement the ozone and $PM_{2.5}$ national ambient air quality standards ("NAAQS") that will lead states to require SO_2 and NO_x emission reductions from EGUs in order to attain these NAAQS; and (3) a New Source Performance Standard covering SO_2 and NO_x emissions (and other pollutants) from EGUs, following EPA's agreement to seek a voluntary remand of this rule issued by the prior administration.

Second, with respect to mercury – and all HAPs – emitted by EGUs, EPA has just agreed to enter into a consent decree compelling the agency to issue by November 2011 final Maximum Achievable Control Technology ("MACT") standard for all HAPs emitted by coal-fired and oil-fired EGUs.

We believe the effect of passing 3P legislation could be the following. Beginning with the relatively easier case, the mercury section of the most recent version of the 3P legislation that we have seen preserves EPA's authority and obligation to issue EGU-specific MACT standards covering all HAP emissions from coal-fired and oil-fired EGUs under section 112(d). This is consistent with current law. The amendment further provides that such MACT standards must achieve *at least* a 90% reduction in mercury emissions when applied to the universe of coal- and oil-fired EGUs in the utility sector as a whole. It is our strong belief that a lawful future MACT standard will exceed this level of mercury reductions from the entire utility sector, with individual EGUs required to achieve greater than 90% mercury reductions. The bill and current law then require EPA to achieve reductions of all other HAPs from EGUs corresponding to the performance of the average of the top 12% of best-performing EGUs with respect to each HAP emitted. Accordingly, we believe that the current Clean Air Act and the 3P legislation authorize and require EPA to achieve the same level of HAP reductions, including mercury emissions, from all coal- and oil-fired EGUs in the country.

Turning to the SO_2, and then NO_x, emissions from EGUs. It is our present belief that a lawful and protective MACT standard will generate equal or greater reductions in SO_2 emissions from EGUs than the SO_2 levels corresponding to the phase I, phase II or phase III SO_2 cap levels in the 3P legislation. This is due to the pollution control devices that a MACT standard will compel in order to control whole classes of HAPs, control measures that will lead to tremendous reductions in SO_2 (and $PM_{2.5}$) emissions as well. The MACT standard must require compliance by no later than November 2014, with the possibility of a one-year extension on a case-by-case basis if necessary for the installation of controls. This would put the outside compliance date with MACT at November 2015.

By contrast, the phase III cap date in the 3P legislation is the end of calendar year 2018. The 3P legislation further provides for the possibility of EPA lowering the phase III SO_2 cap even further in 2021 if appropriate to meet health or environmental objectives, but the outcome of that possibility is not something NRDC can assess at this time.

EPA is also expected to issue a rule some time in 2011 to replace the Clean Air Interstate Rule remanded to the agency by the D.C. Circuit, with a future compliance schedule not yet established. That rule will reduce SO_2 emissions and NO_x emissions in the eastern half of the U.S. from EGUs, and should provide earlier SO_2 (and NO_x) reductions than the MACT standard will achieve by 2014 or 2015 at the latest. EPA's initial Clean Air Interstate Rule was slated to achieve very substantial reductions in SO_2 and NO_x, and the plight of downwind states suffering from air pollution transport demands even greater reductions than the prior administration required. With EPA not having proposed or finalized a CAIR replacement rule, however, it is not possible to identify what level of SO_2 and NO_x reductions might be achieved earlier than (and beyond) the compliance period for MACT standards.

The additional ozone and $PM_{2.5}$ rulemakings mentioned above (an NSPS for the utility sector and NAAQS-related rules) also will require SO_2 and NO_x reductions from EGUs, but we cannot say with any certainty what those levels would be beyond the reductions achieved under the CAIR replacement rule and MACT.

2) More generally, I would like your take on the 3Ps legislation, including any concerns you may have about this proposal.

A. In the response to Question 1 above, I indicated our conclusion that the current Clean Air Act and the 3P legislation examined authorize and require EPA to achieve the same level of HAP reductions, including mercury emissions, from all coal- and oil-fired EGUs in the country employing MACT standards. This leads us to observe there is not a genuine legal need for the mercury section of 3P legislation, since current law already affords that legal authority. Second, it is not clear that the provisions of the 3P legislation for other pollutants would result in the same or greater control than could be achieved by current law.

Another issue to be assessed with 3P legislation is whether it would make passage of comprehensive climate protection legislation more difficult. The monumental challenge of climate change demands a strong, immediate solution. Complicating challenges to that legislative imperative must be evaluated very closely.

Senator James M. Inhofe

1. Earlier this week Secretary Chu indicated that it could be 8-10 years before there is deployment of carbon capture technology. Additionally, Secretary Chu said CCS would increase the price of power derived in this manner by 80% compared to regular coal prices. I understand that last week you signed a letter stating that you believe CCS is ready to begin deployment at a large scale in commercial plants today. Do you know of any specific projects where construction can begin next year with appropriate funding? Does this project mean that it is possible to have "clean coal"?

A. NRDC is aware of several projects where the project developers have indicated in public statements that technical issues do not present obstacles to moving forward. Examples of some such projects include the following:
Hydrogen Energy, Calfornia
Summit Power, Texas
Tenaska Sweetwater, Texas
Duke Energy Edwardsport, Indiana

The date on which construction for such projects could begin will depend on securing financing and completion of needed permit processes. These projects have the potential to demonstrate that coal plants can achieve significant levels of carbon dioxide capture, which would be a very positive development in helping to reduce the conflict between coal use and climate protection.

Senator David Vitter

1. NRDC is a not-for-profit, tax-exempt, membership organization, correct?
Your mission statement says that you "work to restore the integrity of the elements that sustain life -- air, land and water-- and to defend endangered natural places."

A. Correct.

2. Are you familiar with Section 165 of the Clean Energy Jobs and Power Act?
This is the section that sets up a "Certified Stoves Program."
The Certified Stoves Program in Section 165 allocates $20 million over the period 2010 through 2014 to:
(1) ensure that all new wood stoves meet specific standards of performance set by EPA;
(2) ensure that all old wood stoves returned under the program are destroyed; and
(3) provide funding for "eligible entities" to replace old wood stoves with new conforming stoves, includinginstallation and repairs.
What makes this so interesting is that "eligible entities" are either states, Indian tribes, or "nonprofit organization that ... provides pollution reduction services and ... has as a primary purpose of promotion of air quality or energy efficiency."

A. We are aware that this provision is in the bill. However, NRDC had no involvement in the development of this provision or its inclusion in either the House or the Senate bill.

3. Do you find it suspicious that only nonprofit entities with a primary purpose of promotion of air quality or energy efficiency are eligible for this $20 million revenue stream?

A. NRDC had no involvement in the development of this provision or its inclusion in either the House or the Senate bill. We are not aware of its origin nor the identity of the proponent of the provision or any intended eligible entities. Given our lack of information about this provision, we have no basis for being suspicious regarding the definition of eligible entities.

4. According to the mission statement I just read, it certainly appears that NRDC is uniquely positioned to qualify as an "eligible entity" for this $20 million handout to replace wood stoves, does it not?

A. We have not assessed whether NRDC would be an eligible entity because NRDC has no intention of seeking any funds pursuant to the program should it become law.

5. Bottom line, does the passage of this bill or something like it figure into NRDC's business plan for the future?

A. No.

6. Will NRDC commit right now not to be a profiteer from S. 1733 and the programs it creates? Self-Dealing in the Bill: Third-Party Verification, etc?

A. Yes.

7. Offsets-more specifically, the availability of offsets-are a huge piece of the puzzle when it comes to the cost of this bill, correct?

A. Available analyses do assume that offsets will have a significant impact on projected compliance costs under the program.

8. To get credit for an offset, the offset must be verified, correct?

A. That is our understanding.

9. Verification of offsets is a tremendous new business stream for a company or group with expertise in this area, is it not?

A. NRDC does not know how significant a business stream offset verification services might be but we assume it could be significant for organizations that specialize in such activities.

10. Does NRDC have any plans to enter the third-party verification business?

A. No. NRDC has no intention of entering into the third-party verification business.

11. NRDC receives a significant amount of money from the federal government in attorney's fees from lawsuits, correct? Are the Judgment Fund and the Equal Access to Justice Act the only legal tools by which you receive attorney fee reimbursements? How much money from the Judgement Fund and the EAJA has NRDC received over the last year, three years, 5 years and ten years?

A. When it prevails in litigation against the federal government, NRDC is entitled to recover its reasonable attorneys' fees and costs pursuant to the Equal Access to Justice Act (EAJA). During the last ten years, NRDC has recovered such fees in various cases. To the best of our knowledge, the Judgment Fund is often the source for paying such fees. EAJA is the legal tool by which we recover attorneys' fees against the federal government. Other federal statutes enable prevailing plaintiffs, including NRDC, to recover reasonable attorneys' fees from private defendants. In the time available, we cannot provide a precise figure for the amount of fee recoveries NRDC has received from the Judgment Fund and/or under EAJA during the last 1, 3, 5, or 10 years, but we estimate that, on average, such fee recoveries do not exceed 3% of NRDC's annual operating budget. In the IRS form 990 that NRDC filed for its fiscal year 2008 we reported court awarded fees totaling $3,491,553. This total includes all court awarded fees, not just those involving litigation against the federal government and we are not able in the time available to provide the amount relating only to litigation against the federal government.

12. Are a number of NRDC lawsuits against energy projects? In total, how many employees would the projects you have filed lawsuits against over the last five years employed?

A. NRDC has filed a number of lawsuits against energy projects or against state and federal agencies who have granted permits for such facilities without complying with applicable law. We have no way of knowing the impact of our litigation on employment. Determining that impact would require knowing what effect a particular litigation had on a project, which is often difficult or impossible to discern given the number of other factors affecting financing, construction, and operation. In addition, since we often seek the tighter pollution controls we believe the law mandates, some of our lawsuits, if successful, create jobs by prompting creation, installation, operation, and maintenance of pollution control equipment.

13. Please produce for me a list of the lawsuits that are challenges to projects from companies who give money to NRDC, versus the challenges to projects from companies that do not?

A. NRDC's policy is that we do not solicit or accept contributions from companies in sectors related to our programmatic activities, which includes companies with projects that we might either support or challenge.

14. Let's assume your point of view prevails and this bill is signed into law. Do you expect that financial support for your organization will wane?

A. We do not expect that the passage of climate legislation will affect contributions to NRDC.

15. If less people are giving NRDC money (because it has addressed climate change), then how will NRDC continue doing business at the level it currently operates at?

A. As stated above, we do not expect that passage of climate legislation will affect contributions to NRDC.

16. Does NRDC oppose traditional coal-fired power plants?

A. NRDC opposes construction of new coal-fired power plants that do not provide best available controls to minimize their emissions. For carbon dioxide emissions, NRDC's position is that such plants should include systems to capture the unit's carbon dioxide emissions and safely dispose of those emissions in secure geologic formations.

17. Does it agree with other environmental groups that all coal-fired power plants should be shut down?

A. NRDC does not have detailed knowledge of the specific positions of other environmental groups. NRDC's objectives with respect to coal-fired power plants are focused on reducing air and water pollution from such plants, managing ash disposal safely and sourcing coal from mining operations that are operated sustainably and avoid destructive practices like mountain-top removal mining. NRDC supports deployment of carbon capture and disposal systems for large fossil-fueled stationary sources, included but not limited to coal-fired power plants. As stated above, NRDC supports use of such systems for new coal-fired power plants from the date of initial operation. For existing fossil-fueled power plants, NRDC supports application of such systems as one of the options for reducing emissions from such plants.

18. Philosophically speaking, do you think it is right for a nonprofit entity to actively work to kill an industry?

A. NRDC does not have an agenda that is aimed at killing industries. If the reference in your question is to the use of production and use of coal, NRDC's objective is to develop policies that will achieve continual reductions in the damages from the production and use of coal.

Senator BOXER. Thank you for those words. That was wonderful.

Our next speaker is Eugene Trisko, Attorney at Law, on behalf of the United Mine Workers of America. The United Mine Workers is a union with a membership that includes coal miners, clean coal technicians, health care workers, truck drivers, manufacturing workers and public employees throughout the United States and Canada.

We are very pleased you could be here with us, Mr. Trisko.

STATEMENT OF EUGENE TRISKO, ATTORNEY AT LAW, ON BEHALF OF THE UNITED MINE WORKERS OF AMERICA

Mr. TRISKO. Thank you, Madam Chair, Ranking Member Inhofe and other distinguished members of the committee. We appreciate the opportunity to be here today to testify on behalf of the Mine Workers.

Because the Chairman's mark may be expanded with the addition of energy and other proposals or otherwise revised, the union does not take any position on the bill at this time.

The UMWA has sought technological solutions to the environmental challenges facing coal use for decades. The union prefers balanced national climate legislation to U.S. EPA regulation of greenhouse gas emissions or piecemeal regional climate programs.

The union recognizes that national legislation is the best means to balance competing energy, economic and environmental interests, while assuring incentives for the deployment of carbon capture and storage technology. These technologies are essential for meeting any global carbon reduction goals over the next century.

The UMWA greatly appreciates the work of the Senate Coal Group, much of which is reflected in the Chairman's mark. The union remains concerned, however, about several aspects of the bill. S. 1733 would impact virtually every aspect of energy supply and demand in this country. We look forward to complete EIA and EPA analyses of the legislation.

We endorse the adoption in section 125 of non-budget support for the early demonstration of CCS technologies. Appropriated funds cannot provide the security for financial planning that developers of these projects require.

We also agree generally with the bill's allocation approach for the electric sector. At the same time, however, we note that allocations based in part on electricity sales can penalize coal dependent States and benefit States with lower carbon emissions. The union prefers the use of an emissions based formula to reduce economic impacts of the bill on coal States.

Let me highlight a few of the areas of real concern to the union as it considers this legislation. First, the 20 percent reduction target by 2020 is certain to lead to massive switching from coal to natural gas because CCS technologies will not be widely deployed by that time. The bill recognizes the commercial use of CCS by 2020 will likely be limited to a handful of early mover plants. Reducing our greenhouse gas emissions 20 percent below 2005 levels is equivalent to removing 218 million passenger cars, trucks and SUVs from the road by 2020, virtually the entire fleet, or eliminating all energy related emissions from 92 percent of U.S. homes. And this calculation assumes no growth of emissions.

EIA's August, 2009 analysis of the House bill shows that coal use in the basic case is 47 percent below projected 2030 reference case levels. Moreover, if EIA's assumptions about tripling nuclear power by 2030 are optimistic, utilities would have little choice but to switch from coal to natural gas on an unprecedented scale. We therefore urge moderation in the choice of the 2020 target.

Second, CCS bonus allowances received approximately 4.6 percent of the House allowance pool, compared to an 8 percent allocation in the 2007 Bingaman-Specter bill, a bill we supported along with the AFL–CIO. With a smaller Senate allowance pool, a larger percentage allocation is needed to match the number of allowances provided by the House bill. The bill also needs to resolve long-term liability issues for early mover demonstration plants.

Third, we need strong border adjustment provisions. I will leave it at that, based on the testimony of the previous panels.

EIA's analysis shows that offsets are critical in moderating the economic impact of climate legislation. We believe additional improvements to the bill are warranted on the international side independent of the outcome of the negotiations in Copenhagen, and we are working with Senate staff on this front.

Our statement offers a few observations on the prospects for longer term international progress on climate change targets and mitigation and cautions against a unilateral approach to reaching targets that have not yet been adopted by the U.N. framework convention process.

We welcome questions on all of these issues and appreciate this opportunity. Thank you, Madam Chair.

[The prepared statement of Mr. Trisko follows:]

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Statement on behalf of the United Mine Workers of America, AFL-CIO Before the Committee on Environment and Public Works United States Senate October 29, 2009 S. 1733, Clean Energy Jobs and American Power Act

Chairman Boxer, Ranking Member Inhofe and distinguished members of the Committee:

I am pleased to be here today to testify on behalf of the United Mine Workers of America (UMWA), the labor union representing the nation's organized coal miners. I have represented the UMWA in clean air and global climate change issues for more than 20 years, including participation as an NGO at all major United Nations climate negotiating sessions subsequent to the 1992 Rio Earth Summit. A copy of my bio is Attachment 1. Attachment 2 is a recent op-ed by UMWA President Cecil E. Roberts outlining the union's concerns with current climate change legislation. My testimony addresses these issues in more detail.

The Clean Energy Jobs and American Power Act Act (S. 1733) is being considered as the Senate counterpart to H.R. 2454, the energy and climate change legislation adopted last June by the House of Representatives. We are very pleased to have the opportunity to comment on this proposed legislation, and will focus particularly on its cap-and-trade and carbon capture and storage provisions. Because the Chairman's Mark was just released as this statement was being prepared, and because the bill may be expanded with the addition of energy and other proposals, the union does not take any position on the bill at this time.

Background

The UMWA has sought technological solutions to the environmental challenges facing coal production and use for decades. The union fought, but ultimately lost, a 10-year legislative battle to require large coal-based generating plants to install available scrubber technologies to reduce their sulfur emissions. Due to fuel-switching to meet Title IV acid rain emission reductions, coal production in major eastern coal producing states declined by more than 113 million annual tons between 1990 and 2000. More than 30,000 coal mining jobs were lost. Dozens of mining communities have all but ceased to exist across economically-depressed Appalachia and the rural Midwest.

The UMWA recognizes that climate change legislation represents the greatest threat to its membership and to the continued use of coal. In July 2007, the UMWA, the AFL-CIO and other industrial unions endorsed the bipartisan Bingaman-Specter climate change bill (S.1766). In our view, that bill provided an appropriate balance of technology incentives, reasonable emission reduction targets and timetables, and safeguards for the economy. Achieving the proper balance among technology incentives, the timing and stringency of emission reductions, and economic safeguards will be essential for obtaining broad bipartisan support for climate legislation.

Preference for National Legislation

The UMWA strongly prefers properly balanced national climate legislation to U.S. EPA regulation of greenhouse gas emissions, or to piecemeal state and regional climate programs. U.S. EPA regulation of greenhouse gas emissions is already underway in response to the Supreme Court decision in *Massachusetts v. EPA* (2007). The union recognizes that national legislation is the best means to balance competing energy, economic and environmental interests, while assuring appropriate incentives for the development and deployment of advanced coal generation employing carbon capture and storage (CCS) technologies. These technologies will be essential for meeting any national or global carbon reduction goals over the next century. The United States should position itself as the technological leader of CCS development in order to foster its widespread adoption here and abroad.

While the UMWA did not endorse H.R. 2454, the union supported the House climate process, and was encouraged by the provisions of the bill supporting non-budget funding for the early demonstration of CCS technologies, and bonus allowance support for subsequent commercial deployment of CCS. The UMWA likewise views the work of the Senate Coal Group, much of which is reflected in the Chairman's Mark, as providing important forward progress in the development of comprehensive climate legislation. The union remains concerned, however, about a number of aspects of the bill, including the stringency of its initial targets and timetables, the uncertainties of adequate supplies of domestic and international offsets, the elimination of the House provisions preempting future EPA regulation, and its potential adverse impacts on domestic coal production and related coal mining employment.

The Role of Coal in America's Energy Supply

Coal is an indispensable part of America's energy supply. The U.S. has a demonstrated coal reserve base of 487 billion tons, with an estimated 267 billion tons of recoverable reserves.[1] Our recoverable coal reserves have the energy equivalent of roughly one trillion barrels of oil, equal to world known oil reserves.

Approximately one-half of our electricity is generated by coal. Twenty three states rely on coal for more than half of their electric supplies, while another 12 states receive 25% to 50% of their electricity from coal (see map below).

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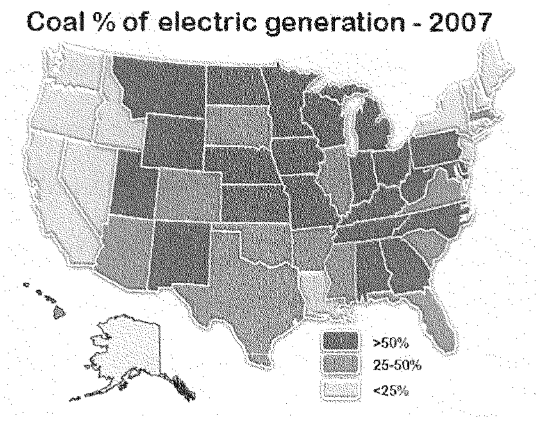
[1] http://www.eia.doe.gov/cneaf/coal/page/acr/table15.html



Source: U.S. DOE/EIA, Electric Power Annual (2008)

To reduce coal in our energy supply mix means using another fuel to replace it for baseload generation, most likely a combination of nuclear and natural gas, supplemented by renewable energy. Such a fundamental shift in U.S. energy policy would bring into question the cost and the availability of natural gas supplies. Substantial increases in demand for natural gas, even with enhanced domestic supplies, likely would lead to higher electric generation costs and higher natural gas costs for consumers and industries. Current natural gas futures prices indicate gas prices increasing from $5.48/mcf in December 2009 to $7.20/mcf in January 2011 and $8.03/mcf in January 2015 – before climate legislation has been enacted.[2]

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[2] Data from NYMEX as of October 26, 2009, at http://www.nymex.com/ng_fut_csf.aspx

S. 1733 Requires Comprehensive Economic Analyses

Due to its aggressive emission reduction targets and timetables, S. 1733 would impact virtually every aspect of energy supply and demand in this country. We look forward to complete U.S. DOE/EIA and U.S. EPA analyses of the economic, energy and environmental impacts of this legislation, and hope that these studies will be available to guide the Committee's deliberations. EPA's preliminary evaluation of the bill, released on October 23, relies mainly on previous studies of the House bill, and does not provide any coal market impact results.

Support for Senate Coal Group Recommendations and for Non-Budget Early CCS Demonstrations

There is much in this proposed legislation that UMWA supports, including improvements to the House bill recommended by the Senate Coal Group in areas such as advance payments for CCS bonus allowances, increasing the threshold for CCS-based NSPS standards for new coal plants from 4 Gigawatts to 10 Gigawatts of demonstrated capacity, redefining the bases for CCS bonus allowances to net "treated" capacity, and making methane from coal mines and landfills potential sources of domestic offsets, rather than regulated source categories.

We strongly endorse the adoption in Section 125 of non-budget support for the early demonstration of CCS technologies on a commercial scale. Changes to this provision since its initial development in the House by Rep. Rick Boucher have enhanced the role of state public utility commissions, ensuring greater transparency and accountability. Appropriated funds cannot provide the security for financial planning that developers of multi-billion dollar projects require.

This non-budget support for early CCS deployment is based on the unanimous recommendations of the U.S. EPA Advanced Coal Technology Work Group (ACT). In January 2008, U.S. EPA's ACT Work Group, representing a broad array of industry, state and environmental stakeholders, including the UMWA, unanimously recommended that Congress create a Carbon Capture and Storage Early Deployment Fund to defray the additional costs and risks of these technologies.

Early Demonstration of CCS is Essential

The capture and geological storage of CO2 is the key to retaining domestic coal as a viable energy supply in the context of constrained U.S. greenhouse gas emissions. While various private and federal research programs are exploring the potential for carbon sequestration, a secure and adequate funding source is not available to accelerate essential applied research, development and commercial-scale demonstration of carbon capture and storage as a viable commercial option for existing and future coal-based energy providers.

The 2007 MIT report, *The Future of Coal*, cautioned that:

> "Today, and independent of whatever carbon constraints may be chosen, the priority objective with respect to coal should be the successful large-scale demonstration of the technical, economic, and environmental performance of the technologies that make up all of the major components of a large-scale integrated CCS system — capture, transportation and storage. Such demonstrations are a prerequisite for broad deployment at gigatonne scale in response to the adoption of a future carbon mitigation policy, as well as for easing the trade-off between restraining emissions from fossil resource use and meeting the world's future energy needs." (*Id.*, at xi.)

MIT also concluded that current funding for advancing CCS was "completely inadequate":

> At present government and private sector programs to implement on a timely basis the required large-scale integrated demonstrations to confirm the suitability of carbon sequestration are completely inadequate. If this deficiency is not remedied, the United States and other governments may find that they are prevented from implementing certain carbon control policies because the necessary work to regulate responsibly carbon sequestration has not been done. Thus, we believe high priority should be given to a program that will demonstrate CO2 sequestration at a scale of 1 million tonnes CO2 per year in several geologies. (*Id.*, at xii.)

More recently, an MIT Energy Initiative Symposium echoed the basic premises underlying Section 125's provisions for an early CCS demonstration program with secure, non-budget funding:

> **"The Federal government should dramatically expand the scale and scope for utility-scale commercial viability demonstration of advanced coal conversion plants with CO*2* capture. The program should specifically include demonstration of retrofit and rebuild options for existing coal power plants. New government management approaches with greater flexibility and new**

> **government funding approaches with greater certainty are a prerequisite for an effective program. ...**
> Such a strategy can be begun under the current DOE Clean Coal Power Initiative (CCPI) demonstration program, if it is expanded and has enhanced flexibility for speeding up the government process and for private sector project management and financial accounting. However, new legislation should be considered in parallel with the CCPI program solicitation and implementation. An expanded commercial viability utility-scale demonstration program should be established through a quasi-government corporation. The authorities of the new corporation should be designed with a broader mandate than that of the CCPI program, encompassing the full range of low-carbon electricity technologies and fuels and financed from a multi-billion dollar annual small electricity line charge (as has been under consideration in the Congress)." [3]

Congress should heed these recommendations. CCS technologies are the only means for assuring that domestic coal can continue to supply a significant share of our electric generating needs in a carbon-constrained environment. As discussed below, the widespread deployment of CCS technologies also can provide a major source of new, well-paying low-carbon jobs involving a broad range of skills.

The U.S. must take the lead in establishing the technical and commercial viability of CCS technologies for use both here and abroad. The world's ability to stabilize global CO_2 concentrations – the long-term goal of the U.N. Framework Convention on Climate Change - depends upon the willingness of major developing economies like India and China to accept meaningful commitments to reduce their future greenhouse emissions. These countries have vast coal reserves, and will continue to rely upon them to support their economic development.

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[3] MIT, Retrofitting of Coal-Fired Power Plants for CO2 Emissions Reductions: Energy Initiative Symposium at 7-8 (March 23, 2009, emphasis in original).

Support for Commercial Deployment of CCS Technologies

The UMWA supports the objectives of the CCS commercial incentives provided by the Senate Coal Group's recommendations, reflected in the Chairman's Mark, such as the measurement of qualifying capacity based on net "treated" capacity sequestered, and the award of advance CCS bonus allowances. A financial mechanism such as bonus allowances is needed to defray the incremental capital and operating costs of CCS technologies at new and retrofit plants relative to units not employing carbon controls. Advance payments of bonus allowances will help developers to secure financing – an increasingly difficult hurdle for major projects.

Regarding the potential scope of bonus allowances available for CCS applications, the Committee should consider the potential demand from both new and retrofit facilities. There are more than 300 Gigawatts of existing coal capacity across the nation. As recognized by the recent MIT symposium on retrofit opportunities,[4] many of the larger units (>300 MW) equipped with conventional pollution controls and located near carbon storage sites may represent viable candidates for retrofit CCS controls. The demand for new coal plant applications also must be considered.

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[4] *Id.*

CCS bonus allowances received approximately 4.6% of the H.R. 2454 allowance pool, compared to the 8% CCS allocation provided in the 2007 Bingaman-Specter bill (S. 1766). With a smaller Senate allowance pool available for allocations and bonus allowances, a larger percentage allocation would be needed to match the number of allowances provided by H.R. 2454. The recent EPA report qualitatively discusses this issue, but it does not provide comparative findings on projected CCS deployments under the House and Senate bills.[5]

Job Benefits from CCS Commercial Deployment

The National Commission on Energy Policy issued the report of its "Task Force on America's Future Energy Jobs" in September 2009.[6] The Task Force consisted of representatives of academic, industry, environmental and labor organizations, including the AFL-CIO, UMWA, IBEW and Boilermakers.

The Task Force relied in part on electric power job data provided by Bechtel Power Corporation, a major international power engineering and construction company. Bechtel's workforce estimates for alternative generation technologies show that coal-based CCS and nuclear generation options have substantially larger job creation potential than other supply options such as natural gas and wind:

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[5] U.S. EPA, Economic Impacts of S.1733: The Clean Energy Jobs and American Power Act of 2009 (October 23, 2009) at 14-15.

[6] National Commission on Energy Policy, Task Force on America's Future Energy Jobs (2009). Solar electric options also have relatively high job creation potential, but are not projected to supply significant amounts of future electricity due to cost and geographic constraints.

Man-Years per Gigawatt of New Generation Capacity, Development plus Construction Phases

Technology	Salaried Workforce	Hourly Workforce	Total Man-Years
Nuclear	4,785	9,575	14,360
Supercritical PC coal with CCS	2,140	8,435	10,575
IGCC gasified coal with CCS	2,795	8,145	10,940
Natural gas combined cycle (NGCC)	495	1,270	1,765
Onshore wind	305	1,180	1,485

Source: NCEP, Task Force Report on America's Future Energy Jobs (2009).

These findings are normalized to 1 Gigawatt of electric capacity, equivalent to one 1,000 Megawatt coal or nuclear unit, or 250 wind turbines with 4 MW of generating capacity per turbine. These four generating supply options – nuclear, gas combined cycle, advanced coal with CCS, and wind - are projected by most analysts to meet most of the nation's demand for new electric capacity under climate change legislation.

Need to Address CCS Liability

S.1733, like H.R. 2454, calls for a study of long-term liability and related legal framework issues for CCS projects. While the interagency study recommended by S. 1733 is appropriate, along with the provisions calling for a coordinated approach to siting and permitting new facilities, provisions need to be added to the bill resolving long-term liability issues for early-mover demonstration plants. We understand that these issues may be addressed through current energy legislative proposals.

Support for Strong Border Adjustment Provisions

The Chairman's Mark contains a placeholder for a border adjustment mechanism:

> **"SEC. 765. INTERNATIONAL TRADE.**
> "It is the sense of the Senate that this Act will contain a trade title that will include a border measure that is consistent with our international obligations and designed to work in conjunction with provisions that allocate allowances to energy-intensive and trade-exposed industries."

The House adopted a weakened version of a program of border adjustments on goods and products imported from countries that have not adopted comparable greenhouse gas controls. The House provision departed substantially from that included in the Warner-Lieberman bill (S. 3060). Changes to the proposal included delaying its start date to 2020, replacing the "comparability" test with a "competitiveness" test more likely to be challenged successfully under WTO, and transferring administrative authority and discretion over the program to the President rather than to an independent commission subject to judicial review.

These modifications weaken the prospective effect of the border adjustment proposal, and reduce the pressure on developing nations to adopt greenhouse gas controls. We are advised that the revisions improve the likelihood of successful challenges under WTO.

With major developing economies unlikely to agree to any form of enforceable emission caps under the UN FCCC process in Copenhagen this year - or for the foreseeable future - the U.S. should not limit its options for helping to create a level playing field in international commerce. At the 1992 Rio Earth Summit, there was no expectation that within less than 20 years China would emerge as the world's largest coal consumer, the dominant source of manufactured goods exported to the United States, the world's largest emitter of greenhouse gases, and the holder of vast quantities of U.S. Treasury debt in its Sovereign Wealth Fund.

We recommend that strong border adjustment provisions be incorporated in S.1733 without the weakening changes in the House bill. Adoption of strong border adjustment provisions would help to close the largest loophole in the UN Framework Convention on Climate Change and the Kyoto Protocol: the exemption of developing countries from quantified emission limitation and reduction obligations.

Support for Free Allocations to the Electric Sector

The UMWA favors the largest possible use of allowance allocations to the electric supply sector and its consumers as well as to vulnerable manufacturing and energy-intensive industries.

The UMWA supports the recommended approach to allocations to electric suppliers and independent generators outlined in a joint letter to Congress in March 2009 by the IBEW and the Utility Workers of America (Attachment 3).

The allocation of emission allowances downstream to electric utility "wires" companies (on behalf of their consumers) avoids the risk of windfall profits, while an appropriate allocation to independent generators in restructured states, sufficient to offset their compliance costs, will reduce the risk of large-scale switching from coal to natural gas. Auctions, in contrast, ensure that the costs of obtaining allowances would be passed through immediately to customers, increasing the cost of the program and reducing public acceptance.[7] The Title IV SO2 allowance allocation program, with bonus allowances for early adoption of technology, is a good example of how direct allocations can minimize customer costs while providing incentives for early use of control technologies.

At the same time, however, the UMWA recognizes that an allocation formula based in part on electricity sales can penalize coal-dependent states and confer benefits on states with lower carbon emissions profiles. The union strongly prefers the use of an emissions-based formula to reduce the economic impacts of climate legislation on coal state economies.

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[7] EPA's October 23rd analysis of S. 1733 confirms this observation in its finding that a projected 13% electric rate increase in the 2030 policy case reflects the phase-out of free allocations by that time. EPA, *op cit.*, at 17-19.

Concerns about Timing and Stringency

S. 1733 proposes a very aggressive schedule of greenhouse gas emission reductions that could lead to large-scale displacement of coal-based generation before CCS technologies can be adequately demonstrated for widespread commercial use. Of all the concerns addressed in this testimony, this is the most fundamental. The UMWA is less concerned about the bill's long-term proposed reduction target of 83% below 2005 emissions by 2050 – assuming that CCS technologies can be widely deployed well before that time - than by the 20% reduction target for 2020.

Any new power plant designed for CCS technologies and scheduled to be in commercial operation by 2020 should be in the design and siting process today. S. 1733 recognizes, through its adoption of the early CCS demonstration provisions of the House bill, that commercial use of CCS by 2020 is very likely to be limited to a handful of early-mover plants. The 2020 target also should recognize that the electric generation sector tends to bear the brunt of national emission reductions in an economy-wide trading scheme, well in excess of its contributions to greenhouse gas emissions.

The Energy Information Administration of the U.S. Department of Energy (DOE/EIA) released an economic analysis of H.R. 2454 on August 5, 2009. EIA used the National Energy Modeling System to estimate the energy market, GDP and other economic impacts of the House bill. Due to limitations in the model, impacts were estimated only to the year 2030, when the national greenhouse gas emission cap declines to 42% below year 2005 levels. EIA's modeling of the House bill underscores the UMWA's concerns about the impact of aggressive 2020 emission reduction targets.

The chart below summarizes EIA's findings on the energy market impacts of H.R. 2454:

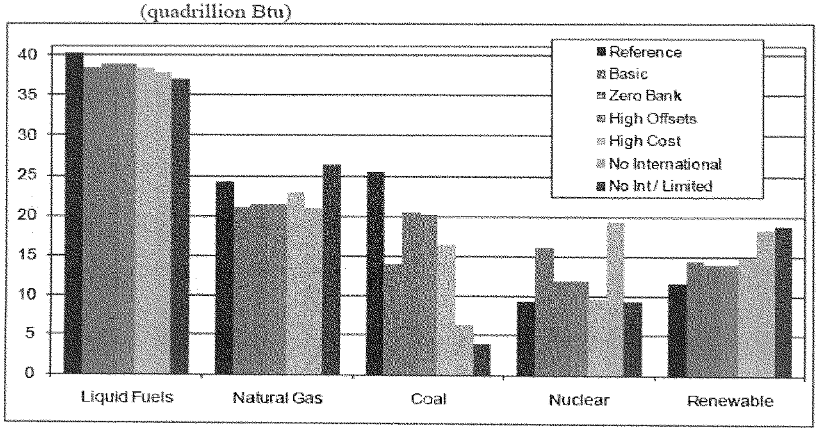

Figure ES-2. Primary Energy Consumption by Fuel in Main ACESA Cases, 2030
(quadrillion Btu)

Source: DOE/EIA, Analysis of HR 2454 (August 2009).

The adverse coal market impacts of H.R. 2454 are most pronounced in the two EIA cases where offsets are limited ("no international" and "no international/limited").[8] In these cases, coal utilization drops from more than 25 Quadrillion BTUs in 2030 (approximately 1.25 billion tons) to levels of 4-6 Quads, a reduction on the order of 75% to 85%. Coal use in the Basic case is about 47% below projected 2030 reference case levels. In the high offset case, however, coal use in 2030 is 11% below 2007 actual levels. This finding emphasizes the need for assurance of adequate supplies of all domestic and international offsets provided by S. 1733.

EIA's projection of a 47% reduction in coal use in the basic case from its 2030 reference case levels underscores UMWA's concerns about the impacts of overly aggressive climate change targets and timetables when CCS is not commercially available on a widespread basis. Moreover, if EIA's basic case assumptions about trebling nuclear power capacity by 2030 proved optimistic, utilities would have little choice but to switch from coal to natural gas on an unprecedented scale.

The critical role of international offsets is evident in EIA's Gross Domestic

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[8] EIA describes these two cases as follows: The No International Case is similar to the Basic Case, but represents an environment where the use of international offsets is severely limited by cost, regulation, and/or slow progress in reaching international agreements or arrangements covering offsets in key countries and sectors.
The No International/Limited Case combines the treatment of offsets in the ACESA No International Case with an assumption that deployment of key technologies, including nuclear, fossil with CCS, and dedicated biomass, cannot expand beyond their Reference Case levels through 2030.

Product and industrial shipment findings shown in the table below. GDP is reduced 0.8% in 2030 in the Basic case (undiscounted), compared to 2.3% in the no international/limited offsets case. Similarly, industrial shipments in 2030 are 2.5% lower than the reference case in the Basic case, declining to -6.8% in the no international/limited offsets case. Industrial shipment impacts are a reasonable proxy for impacts on traditional manufacturing sectors.

Table ES-2. Macroeconomic Impacts of ACESA Cases Relative to the Reference Case
(billion 2000 dollars, except where noted)

	Basic	Zero Bank	High Offsets	High Cost	No International	No Int / Limited
Cumulative Real Impacts 2012-2030 (present value using 4-percent discount rate)						
GDP						
Change	-566	-432	-523	-781	-717	-1897
Percent Change	-0.3%	-0.2%	-0.2%	-0.4%	-0.3%	-0.9%
Consumption						
Change	-273	-196	-252	-384	-323	-988
Percent Change	-0.2%	-0.1%	-0.2%	-0.3%	-0.2%	-0.7%
Industrial Shipments (excludes services)						
Change	-910	-753	-480	-958	-1720	-2877
Percent Change	-1.0%	-0.8%	-0.5%	-1.1%	-1.9%	-3.2%
Nominal Revenue Collected 2012-2030[a]	2971	1292	1332	2299	3462	6350
2020 Impacts (not discounted)						
GDP						
Change	-50	-19	-26	-70	-34	-112
Percent Change	-0.3%	-0.1%	-0.2%	-0.5%	-0.2%	-0.7%
Consumption						
Change	-21	-7	-11	-30	-15	-64
Percent Change	-0.2%	-0.1%	-0.1%	-0.3%	-0.1%	-0.6%
Industrial Shipments (excludes services)						
Change	-68	-54	-32	-69	-108	-186
Percent Change	-1.0%	-0.8%	-0.5%	-1.0%	-1.6%	-2.8%
Nominal Revenue Collected[a]	71	44	46	79	118	215
2030 Impacts (not discounted)						
GDP						
Change	-161	-104	-120	-214	-226	-453
Percent Change	-0.8%	-0.5%	-0.6%	-1.1%	-1.1%	-2.3%
Consumption						
Change	-63	-36	-50	-97	-69	-180
Percent Change	-0.4%	-0.3%	-0.4%	-0.7%	-0.5%	-1.3%
Industrial Shipments (excludes services)						
Change	-183	-125	-87	-198	-338	-506
Percent Change	-2.5%	-1.7%	-1.2%	-2.7%	-4.6%	-6.8%
Nominal Revenue Collected[a]	330	205	211	367	556	1030

Source: DOE/EIA, Analysis of H.R. 2454 (August 2009).

Sensitivity of Coal Impacts to 2020 Reduction Targets

Reducing U.S. greenhouse gas emissions by 20% below 2005 levels by 2020 is equivalent to an emission reduction of nearly 1.2 billion tons of CO2-equivalent.[9] The table below shows the total annual CO2-equivalent reductions associated with alternative 2020 economy-wide reduction targets below 2005 levels, expressed in terms of equivalent annual reductions from U.S. automobiles and the annual emissions of energy used by U.S. homes:

2020 Economy-wide CO2 reductions for alternative reduction targets

2020 Target Reduction (below 2005)	2020 CO2 Emissions (Mil metric tons CO2)	2020 CO2 Reduction (Mil metric tons CO2)	Equivalent U.S. cars (Millions)	Equivalent U.S. Homes (Millions)
-6%	5,623	-358	66	33
-10%	5,384	-597	109	54
-14%	5,145	-836	153	76
-20%	4,786	-1,194	218	108

Source: DOE/EIA, U.S. Carbon Dioxide Emissions from Energy Sources 2008 *Flash* Estimate (May 2009). Equivalent tons for cars and homes are from U.S. EPA emissions calculator, available at http://www.epa.gov/RDEE/energy-resources/calculator.html

The CO2 reductions associated with a 20% cutback by 2020 from 2005 emission levels (assuming no emissions growth since 2005) are equivalent to removing 218 million cars from the road by 2020 - virtually the entire fleet - or eliminating all energy-related emissions from 108 million U.S. homes. For comparison, in 2008 there were 117 million U.S. households, while in 2006 the U.S. had 235 million light-duty passenger cars, trucks and SUVs.

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[9] U.S. DOE/EIA, Annual Energy Outlook 2009 (DOE/EIA-0383, March 2009), Table 18.

Without the widespread availability of CCS technologies for both new and retrofit applications by 2020, a significant portion of these emission reductions likely would be achieved by switching utilities from coal to natural gas and, to a lesser extent, to renewable energy sources. We are not persuaded that evidence of recent CO2 reductions by U.S. sources - reflecting the impact of one of the worst recessions in our history, and the loss of millions of jobs - justifies a 20% reduction target by 2020. The UMWA therefore urges moderation in the choice of the 2020 target, recognizing that the vast majority of emission reductions required by S. 1733 occur later in the program when technological advances should facilitate their implementation.

Need for Assurance of Adequate Offsets

EIA's analysis of H.R. 2454 also highlights the critical role that offsets play in moderating the economic impacts of climate legislation, and the uncertainties inherent in assuring supplies of two billion annual tons of domestic and international offsets:

> While the (2 billion ton/year) ceiling on offset use is clear, their actual use is an open question. Beyond the usual uncertainties related to the technical, economic, and market supply of offsets, the future use of offsets for ACESA compliance also depends both on regulatory decisions that are yet to be made by the EPA, on the timing and scope of negotiations on international agreements or arrangements between the United States and countries where offset opportunities may exist, and

> on emissions reduction commitments made by other countries. Also, limits on offset use in ACESA apply individually to each covered entity, so that offset "capacity" that goes unused by one or more covered entities cannot be used by other covered entities. For some major entities covered by the cap-and-trade program, decisions regarding the use of offsets could potentially be affected by regulation at the State level. Given the many technical factors and implementation decisions involved, it is hardly surprising that analysts' estimates of international offset use span an extremely wide range. One recent analysis doubts that even 150 MMT of international offsets will be used by 2020, while another posits that 1 BMT of international offsets will be used almost immediately from the start of the program in 2012, followed by a quick rise towards an expanded 1.5-BMT ceiling shortly thereafter.[10]

The work that the Senate has done to expand the potential supply of offsets is an important step forward in the process. We believe additional improvements are warranted on the international side, independent of the outcome of the UN FCCC negotiations in Copenhagen. The UMWA has suggested creation of an international offsets bank as an independent agency of the U.S. DOE, empowered to negotiate bilateral or multilateral agreements with nations with large potential supplies of forestry or other offsets. We are pleased that this concept is receiving serious consideration and hope that it can be advanced within the Senate bill or companion offsets legislation.

Support for Integration of State and Regional Climate Programs

A single national federal currency for allowance trading is essential to the operation of an efficient carbon market. Duplicative and overlapping state cap-and-trade programs could raise program costs while achieving no real environmental benefit. We support clear preemption of state and regional cap-and-trade programs affecting sources covered by national legislation, to avoid the creation of a "crazy-quilt" pattern of federal and state regulation.

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[10] DOE/EIA, Analysis of H.R. 2454 (August 2009).

Avoiding the duplication of state CO2 cap-and-trade programs will not impede continued state climate change initiatives focused on energy efficiency and other source sectors. S. 1733 provides states with ample resources to pursue such programs.

Domestic Climate Legislation in a Global Context

As a long-term NGO observer of the UN FCCC process, the UMWA is well aware of the limited prospects in Copenhagen for a new multilateral agreement that will significantly advance the commitments of major developing nations, or that will entail enforceable commitments beyond 2020 for Annex I industrial nations.

While much has been made of the July 8, 2009, agreement among the leaders of the G-8 "to reduce their emissions 80% or more as its share of a global goal to lower emissions 50% by 2050, acknowledging the broad scientific view that warming should be limited to no more than two degrees Celsius," the G-8 agreement itself is not legally enforceable, and its targets have not been adopted within the UN FCCC process.

We view the Copenhagen process – which could extend into 2010 - as likely to produce differentiated commitments for Annex I industrial nations potentially similar to the differentiated targets in the Kyoto Protocol, applicable to the 2013-2020 period after Kyoto's first budget period (2008-2012) has expired. Beyond 2020, industrial nations may agree to a statement of "shared vision" concerning "goals" such as 80% reductions by 2050, but these will be subject to future negotiations, and not to the same enforcement or sanction provisions that might be agreed upon for any new 2020 Annex I commitments. The willingness of developing nations to join in a statement of "shared vision" entailing numerical emission reduction goals for developing countries is very uncertain.

The positions taken thus far by the Group of 77 & China, the large bloc of developing nations that negotiates within the FCCC process, do not promise any breakthrough agreements. At the June 8, 2009, Bonn meeting of the Ad Hoc Working Group on Long-Term Cooperative Actions, the G-77 & China offered its interpretation of the "measurable, reportable and verifiable" emission mitigation actions by developing nations called for by the Bali Action Plan[11]:

> "... (W)e will do as much as we can do, and what we can do is dependent – the extent of what you can do is dependent on meeting commitments on the part of developed country parties in relation to financial resources and transfer of technology. ...
>
> (W)e agree that measurable, reportable and verifiable mitigation actions by developing country parties are only those enabled by measurable, reportable and verifiable provision of financial resources

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[11] The Bali Action Plan, negotiated in Bali, Indonesia, in December 2007, contains the framework for the Copenhagen negotiations.

and technology and capacity building."[12]

The limited prospects in Copenhagen for advancing a global agreement involving enforceable commitments beyond 2020 by industrial nations, or any quantifiable and enforceable commitments by developing nations, raises concerns about the nature of U.S. commitments to 2050 that may be established by national legislation. The dynamic nature of the UN FCCC process - and the widely varied social, political and economic interests of developed and developing nations - supports the need for frequent, periodic assessments of the progress achieved by the FCCC in agreeing to and meeting specified goals such as a 2 degree temperature increase. The assessments called for by the National Academy of Sciences should be helpful in assessing progress toward meeting global climate objectives. However, even with substantial new commitments from developing nations, the U.S. cannot serve as the residual guarantor of a specific target.

EPA's preliminary analysis of S. 1733 supports these observations in its assessment of future CO2 concentrations under the G-8 targets, which assume that developing nations begin a path of absolute reductions of emissions in 2025, and a scenario in which emission growth by developing nations is not eliminated until 2050:

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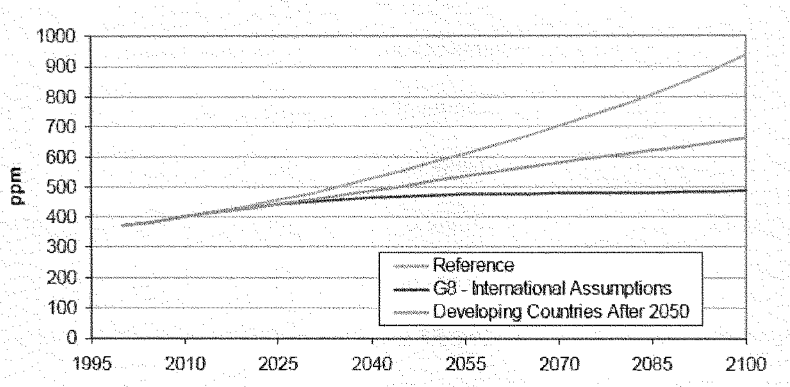
[12] Transciption from Webcast of June 8, 2009, informal plenary session (10 am) of the Ad Hoc Working Group on Long-Term Cooperative Actions, available at http://unfccc2.meta-fusion.com/kongresse/090601_SB30_Bonn/templ/ovw_page.php?id_kongressmain=76.

Figure 5 – CO_2e Concentrations (Climate Sensitivity = 3.0)



Source: U.S. EPA, Analysis of S. 1733 (October 23, 2009), at 28.

EPA indicates that the 2 degree target could be reached under the G-8 scenario, but not with the delayed response by developing nations. The long-term interaction of the oceans and climate further complicate policy responses intended to meet and maintain the target:

> "It should be noted that the temperature change in 2100 in this scenario is not stabilized, so the observed change in global mean temperature in 2100 is not equal to the equilibrium change in global mean temperature. There are two reasons for this. First, while the G8 international goals stabilize global GHG emissions at 50% below 2005 levels, CO2e concentrations and temperature are not stabilized. Determining an equilibrium temperature under any scenario requires additional assumptions about post-2100 emissions. If emissions remain constant post-2100, CO2e concentrations will continue to rise. Equilibrium temperature would only be achieved after CO2e concentrations are in equilibrium. Second, the inertia in ocean temperatures causes the equilibrium global mean surface temperature change to lag behind the observed global mean surface temperature

> change by as much as 500 years. Even if CO2e concentrations in 2100 were stabilized, observed temperatures would continue to rise for centuries before the equilibrium were reached."[13]

Understanding climate change as a 500-year global challenge should caution against the provision of Presidential discretion for federal agencies to use "existing authority" to help meet targets that may be changed before (or after) they are adopted by the world community. Achieving progress toward meeting global climate change objectives, such as the UN FCCC objective to avoid "dangerous anthropogenic interference" with climate, is a process that can only be accomplished through concerted multilateral actions.

Conclusion

The UMWA gratefully thanks the Chairman, the Ranking Member, and the Committee for their consideration of its views.

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[13] U.S. EPA, Analysis of S. 1733 at 29.

Attachment 1

Eugene M. Trisko
Attorney at Law
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Berkeley Springs, WV 25411
(304) 258-1977
(301) 639-5238 (Cell)
emtrisko@earthlink.net

Mr. Trisko has a B.A. in economics and politics from New York University (1972) and a J.D. degree from Georgetown University Law Center (1977). He is admitted in the District of Columbia, and has appeared before the U.S. Court of Appeals for the D.C. Circuit in matters concerning the Clean Air Act. He has lectured on the Clean Air Act and climate change at The Pennsylvania State University, the University of Virginia, and West Virginia University College of Law.

Mr. Trisko was active on behalf of the United Mine Workers of America in the reauthorization of the 1990 Clean Air Act Amendments. He has participated as an NGO on behalf of the UMWA in all major United Nations climate change negotiating sessions since the 1992 Rio Earth Summit. He currently represents the Illinois AFL-CIO, the UMWA and IBEW local unions in the Midwest Governors' Association climate initiative.

Mr. Trisko is a member of U.S. EPA's Clean Air Act Advisory Committee. He served on EPA's Mercury MACT Work Group from 2003 to 2005, and on the Advanced Coal Technology Working Group in 2007-08. In 2000 and again in 2007, he was appointed by the U.S. Department of State to represent U.S. labor and stationary source interests as a member of the U.S. Delegation in bilateral air quality negotiations with Canada. These 2000 negotiations led to the U.S.-Canada Ozone Annex to the U.S.-Canada Air Quality Agreement, including Canadian commitments to match the reduction of EPA's 1998 Ozone Transport Rule (SIP Call).

Mr. Trisko is the author of more than 20 articles on energy, climate and clean air policy issues published in energy, environmental and law journals. Before entering private practice, he served as an attorney with the Federal Trade Commission, and as an energy economist with Robert R. Nathan Associates. He also has appeared as an expert witness on water utility cost of capital before several state public service commissions.

Attachment 2

Sunday Gazette-Mail, Op-ed (Charleston, WV)
September 19, 2009

Cecil E. Roberts: UMWA fighting for better cap-and-trade bill

CHARLESTON, W.Va. -- Coal miners, their families, and those who live in coalfield communities across West Virginia and the nation are worried. They have heard a lot of talk about the effects of legislation pending in Congress that would impose a so-called "cap-and-trade" system on carbon emissions.

Coal miners have a right to be worried. The legislation Congress is considering, also known as the Waxman-Markey bill, will have far-reaching effects, not just on their jobs and their families' future, but on our entire nation's economy.

It is important that Congress get it right. Because if it does not, or even takes no action at all, the consequences will be severe. That's because there is a clock ticking on the wall at the Environmental Protection Agency. If Congress doesn't act to reduce greenhouse gas emissions, then the EPA will. The EPA, as a result of Bush administration policies, was given the authority to do just that in 2007 by the U.S. Supreme Court. Since that time, under both Republican and Democratic administrations, the EPA has been drafting rules and regulations that will restrict greenhouse gas emissions.

No one who works in the coal industry should have any illusions about this. The impact of EPA regulations will mean a relatively swift and painful reduction in coal production and coal jobs. That is the last thing anyone related to our industry should want.

So this is the choice before us: Either Congress acts or EPA acts. Those who say nothing should or need be done about climate change are simply wishing this reality away. Given that choice, the UMWA believes it is far better for Congress to pass legislation that maintains coal's position as the dominant source of electricity generation in America.

Despite what some say, the UMWA did not endorse the Waxman-Markey bill. We were consistent in our belief that while much good work was done to include funding to ensure the future of coal in that legislation, more needs to be done.

That remains our position. Let me be clear: If significant improvements are not made to the bill in the Senate, the UMWA cannot and will not support the legislation.

Here's what we need to see:

A reduction of the 2020 emission reduction target from 17 percent to a more realistic number, in order to provide sufficient time for the development and commercial application of carbon capture and storage technology on new or retrofit plants.

Windfall emission allowance allocations to non-carbon emitting sources should be prohibited.

The Waxman-Markey bill uses a formula for the distribution of allowances that gives a windfall to nuclear, hydro and other non-carbon emitting sources. The UMWA favors an allocation approach that reflects historical emissions.

Assure full funding for commercial carbon capture projects. The Waxman-Markey bill provides $150 billion in bonus emissions allowances for commercial carbon capture and storage applications. However, these bonus allowances should be expanded substantially because they are critical to the widespread deployment of technologies on new and retrofit power plants.

Strengthen provisions on international participation. If other nations, particularly those like China, India and other developing countries, do little or nothing to curb their increasing carbon emissions then this legislation becomes little more than just another mechanism to transfer American jobs overseas. The legislation must ensure that our nation does not suffer severe economic harm should other nations fail to meet their responsibilities.

Assure the full and timely availability of emission "offsets" from domestic and international sources. The bill provides generous credits for activities that reduce carbon, but does not assure that utilities will be able to access these credits in a timely way. The Department of Energy's analysis shows that the availability of emission offsets is a critically important tool to keep coal miners working while emissions are being reduced.

During the discussions and debate in the House about this legislation, the UMWA was just about the only voice at the table speaking out for coal. Because of our efforts and those of coal's friends like Rep. Rick Boucher (D-Va.), much was done to lay the groundwork for the future for coal in this legislation.

But much was left undone. It is not yet clear if the future for coal under this proposed legislation will be a robust one that recognizes the overwhelming availability and cost advantage coal provides our nation's energy producers and consumers.

Until that future has been assured, we will continue to fight in the halls of Congress on behalf of our members, their families and their communities.

Roberts is international president of the United Mine Workers of America.

Attachment 3

March 27, 2009

The Honorable Barbara Boxer
Chair
Senate Environment and Public Works Committee
410 Senate Dirksen Office Building
Washington, DC 20510

The Honorable Jeff Bingaman
Chair
Senate Energy and Natural Resource Committee
304 Senate Dirksen Building
Washington, DC 20510

The Honorable Max Baucus
Chair
Senate Finance Committee
219 Dirksen Senate Office Building
Washington, DC 20515

The Honorable Henry Waxman
Chair
House Energy and Commerce Committee
2125 Rayburn House Office Building
Washington, DC 20515

The Honorable Ed Markey
Chair
House Energy and Environment Sub-Committee
2125 Rayburn House Office Building
Washington, DC 20515

The Honorable Charles Rangel
Chair
House Ways and Means Committee
1102 Longworth House Office Building
Washington, DC 20515

Dear Senators and Congressmen:

Last November we wrote you on behalf of our respective labor unions to express support for balanced, comprehensive legislation to reduce greenhouse gas emissions. We also expressed our strong opinion that emission allowances be allocated, not auctioned, under a cap-and-trade program. Our concern that workers in impacted industries not be adversely affected has become even greater as the economic down-turn has deepened.

We're aware that some economists claim that auctioning allowances would be more efficient than administrative allocations to affected industries. Others who support a large or total auction are attracted by the financial proceeds such an auction would yield. We strongly disagree that auctioning off allowances, particularly in the early phases of a cap-and-trade program, would be best for our nation's energy supply or consumers. We believe an allocation scheme much like that in the successful Clean Air Act acid rain program would greatly mitigate impact on consumers and minimize disruption of our economy and workers. This allocation method has been extremely successful in achieving emission reduction goals at the lowest cost to consumers.

Much has changed since November. The economic slump is severe and appears to be long-lived. Also, two organizations – Edison Electric Institute (EEI) and the United States Climate Action Partnership (USCAP) – each issued principles on cap-and-trade legislation after considerable deliberation. We note with interest that each recommends allocating allowances for the electricity sector to distribution utilities *and* to merchant coal generators who are unregulated, competitive power producers from which utilities in some states purchase electricity for their customers.

In our letter, we recommended allocating all allowances for the electricity sector to distribution companies rather than generators. For regulated electric power markets, where fully integrated utilities own both generation and distribution under state regulation, this approach is sound. However, both the EEI and USCAP proposals recognize the importance of merchant coal generators to consumers in unregulated markets and advocate allocations to cover only their "net compliance costs" over some reasonable transition period until replacement or retrofit technology develops.

We realize the importance of merchant coal generators to our electricity supply as we transition to low-or-zero carbon alternatives. About half of our nation's electricity is produced from coal and about one fourth of that is provided by competitive or merchant generators who sell their output to regulated utilities and their customers. Without allowances, those generators would be forced to retire prematurely early in the transition, which costs all consumers and jeopardizes the system's reliability. Any potential of "windfall profits" for such generators can be addressed by restricting the quantity of allocated allowances to only the amount necessary to cover net compliance costs (defined as incurred allowance cost minus increased wholesale electricity prices).

We urge you to recognize the significant differences in market structures that exist for coal-fired generators in the United States as you deliberate the most effective and efficient way to address greenhouse gas emission allowance allocations. Market-specific allocation schemes will be required to ensure equitable protection to all union members and consumers.

Sincerely,

Edwin D. Hill
International President
IBEW

D. Mike Langford
D. Michael Langford
President
UWUA

/ceb
Copy to President Barack Obama
All Members of United States Congress

Senator BOXER. Thank you so very much.

We want to thank very much our next panelist because he stepped in for Charlie Smith, who was the President and Chief Executive Officer of CountryMark, one of our minority witnesses. And Mr. Smorch is also associated with that company. He is the Vice President—right? Is that correct?—of Strategic Planning for CountryMark, and he was a former Refinery Manager. And we are very pleased that you stepped up to the plate.

How is Mr. Smith doing? He has the flu, I understand.

Mr. SMORCH. He feels better today.

Senator BOXER. Good. Send him our regards.

STATEMENT OF MATT SMORCH, VICE PRESIDENT, STRATEGIC PLANNING, COUNTRYMARK

Mr. SMORCH. Good afternoon, Chairman Boxer and Senator Inhofe. My name is Matt Smorch, and I am Vice President of Strategic Planning for CountryMark Cooperative.

I appreciate the opportunity to represent CountryMark, our employees and our farmer-owners in today's hearing. Today, I will share the CountryMark story and our perspective on the Clean Energy Jobs and American Power Act.

CountryMark's history started in the 1920s when local Indian farmer-owned cooperatives joined together to collectively purchase lubricating oils for their farm equipment. With the discovery of oil in the Illinois basin in the late 1930s, the regional farmer cooperative decided to construct a refinery.

Since then, this regional energy cooperative has grown from the ground up based on the hard work and ingenuity that is found in the American Midwest. Today, CountryMark owns and operates over 400 miles of crude gathering pipelines, a 27,000-barrel-per-day petroleum refinery in Mount Vernon, Indiana, a 238-mile product pipeline that spans the State of Indiana, and five product terminals located throughout Indiana and Kentucky.

CountryMark is Indiana's only American-owned oil refining and marketing company, and it is a true success story in the American energy business. Today, CountryMark employs 350 people, has assets near $600 million, average annual profits of $37 million, and in 2008 we had annual sales of $1.3 billion.

Most of our employees live in rural Indiana and Illinois. In Posey County, Indiana, alone, nearly $27 million in wages and benefits are provided every year. These wages are paid mostly to hourly workers with little opportunity to find equivalent employment in the area.

CountryMark refines 100 percent American crude that is produced in the Illinois basin, which is located in Southern Illinois and Indiana and western Kentucky. In 2008, we purchased more than 9 million barrels of oil, representing $800 million that went into the Midwest economy. This money provides revenue to over 40,000 people and supports employment of 20,000 people in the tri-State area.

Unlike most other refiners, CountryMark is owned and controlled by its local member cooperatives that are in turn owned and controlled by 100,000 individual farmers in Indiana, Michigan and Ohio. This investment by CountryMark's farmer-owners represents a time honored business model of joining resources for the common purpose of purchasing vital goods and services.

In addition to having a secure source of quality products, ownership provides an opportunity to share profits through the cooperative system. Over the past 5 years, CountryMark has returned over $90 million in cash to member cooperatives. CountryMark fuel and lubricants are delivered daily throughout Indiana and neighboring States of Michigan, Ohio and Illinois. CountryMark's fuels power approximately 75 percent of Indiana's production agriculture industry and about half of the public school buses that deliver Indiana children to school each day.

CountryMark has taken a leadership position in the growth and adoption of renewable fuels. The majority of CountryMark gasoline contains ethanol, and CountryMark is Indiana's leader in offering biodiesel. It is estimated that 85 percent of the biodiesel sold in Indiana in 2008 came from one of CountryMark's petroleum terminals.

Even though CountryMark only represents 0.15 percent of the domestic refining industry, by focusing on the integration of American source petroleum and biofuels we have emerged as a recognized leader within the Indiana energy industry. As one of the country's smallest refineries, CountryMark has built a durable operation by providing value added goods and services to our farmer-customers. Our decision to actively promote renewable fuels was not inspired by a Government mandate, but was a prudent business decision. In our view the future market for renewable fuels is strong, and CountryMark is evaluating ways to increase the distribution and production of these fuels.

The reality of a viable renewable fuels industry is that it will be regional in nature. To keep the cost of biofuels low to consumers, production facilities will need to be close to both the feed source and the product distribution network. CountryMark and our cooperative members are well positioned to participate in a renewable fuels industry.

Cap and trade legislation will force CountryMark to rethink these plans because of its extraordinary cost. Even after distribution of no-cost allowances, the cost of carbon taxes on CountryMark are estimated to exceed $100 million per year compared to our average annual net income for the past 5 years of $37 million, this burden clearly indicates the magnitude of current legislation's impact on our economic sustainability.

As a minimum, by requiring CountryMark to purchase allowances exceeding $100 million per year, our finite capital is diverted to the Government, which prevents us from making additional investments that promote renewable fuels. However, a financial strain of this magnitude could also render CountryMark insolvent. The end of CountryMark as a business could deprive our Midwest economy of the investments previously described and trigger a cascade of financial doubt through the farmer cooperative system.

In essence, the high cost of cap and trade legislation has the potential to destroy all American companies like CountryMark and the farmer cooperative system who will be valuable partners in developing and distributing renewable fuels. CountryMark urges Congress to reject cap and trade and rethink the important strategies needed for this Nation to reduce its carbon emissions, develop viable renewable gasoline and diesel fuels, and avoid destruction of critical aspects of our economy in the process.

This legislation as currently drafted does not achieve these goals. However, the goals are achievable through a transparent and practical dialog with small business refiners such as CountryMark.

Thank you.

[The prepared statement of Mr. Smorch follows:]

CountryMark

Submitted testimony for the U.S. Senate Committee on Environment and Public Works

Legislative Hearing on S. 1733, "Clean Energy Jobs and American Power Act."

THURSDAY, OCTOBER 29, 2009
9:30 AM
Dirksen 406

As Congress proceeds with consideration of S. 1733, "Clean Energy Jobs and American Power Act," CountryMark believes it is important for Congress to know about the companies this legislation will impact and how this legislation as currently drafted will affect companies such as CountryMark.

CountryMark's History

CountryMark's history dates back to the 1920s, when several local Indiana farmer-owned cooperatives joined together to collectively purchase lubricating oils for their farm equipment. By 1930, seventy-seven of these farmer-owners formed the Indiana Farm Bureau Cooperative Association (IFBCA).

With the discovery of oil in the Illinois Basin in the late 1930's, IFBCA's farmer-directors saw the need for better quality and more reliably supplied fuels. In pursuit of these goals they began construction of an IFBCA financed refinery in southwestern Indiana. The selected location was ideally situated between the Illinois Basin crude oil fields and the Ohio River barge traffic.

Refinery construction was completed in 1940 and crude processing of 2,500 barrels per day (BPD) (35 million gallons per year) started in April of that same year. IFBCA's initial investment was $330,000 for the refinery, crude oil pipelines, and truck fleet. At the time, the new farmer-owned cooperative had 60 employees and anticipated annual sales for refined products of $1 million.

By the late 1940s, IFBCA was fully involved in drilling for crude oil, refining crude oil into fuel, and distributing its end products to its farmer owners. In the 1950s, IFBCA's operation expanded to justify construction of a 238-mile proprietary pipeline. The pipeline was constructed to better transport and distribute refined products from the refinery in Mt. Vernon, Indiana through the Indianapolis area and north to Peru, Indiana. CountryMark's flagship product, *Super Dieselex-4*, was introduced to the agricultural market in 1961 and the current version of this fuel remains the company's marquee product today. In 1991, IFBCA merged with CountryMark to form the current cooperative.

Eighty-nine years later, CountryMark owns and operates over 400 miles of crude gathering pipelines serving the Illinois Basin, a 26,500 BPD (400 million gallons per year) refinery, and a 238-mile proprietary pipeline – as well as five product terminals. Since IFBCA's refinery investment in 1940, CountryMark's assets have grown to nearly $600 million. CountryMark now employs approximately 350 people and in 2008 annual sales were $1.3 billion.

CountryMark fuel and lubricants are delivered daily to individuals, companies, farms and government entities throughout Indiana and the neighboring states of Michigan, Ohio, and Illinois. CountryMark's fuel products power approximately 75% of Indiana's production agriculture industry, as well as, about half the public school buses that deliver Indiana children to school each day.

Over the years, CountryMark's facilities and processes have been updated as fuel technology and refining innovation has occurred. CountryMark has actively promoted the growth and adoption of renewable fuels. CountryMark has been a longtime proponent of ethanol blended gasoline, and the majority of CountryMark gasoline contains ethanol. Also, in partnership with Indiana's soybean growers, CountryMark is the state's leader in the offering of biodiesel. In fact, the Central Indiana Clean Cities Alliance estimated that 85% of all biodiesel sold in the state in 2008 was sold at one of CountryMark's four Indiana petroleum terminals. By focusing on the integration of American-sourced petroleum and biofuels, CountryMark has emerged as a recognized leader within the Indiana energy industry.

CountryMark - A Legacy of American Energy

CountryMark is Indiana's only American-owned oil refining and marketing company and is recognized nationwide as a leader in the distribution of biodiesel and ethanol.

CountryMark fuels are all-American fuels. The CountryMark refinery uses 100% American crude oil sourced from the Illinois Basin, a 53,000 square mile depression underneath most of Illinois, western Indiana, and western Kentucky. This light, sweet, American crude oil, domestically refined, helps reduce dependency on foreign oil, strengthens domestic energy security, and fuels the American production agriculture economy.

Our all-American operation produces an important financial consequence in our region as well. By sourcing American crude oil, more money remains in the Midwest, supporting local economies. CountryMark purchases over 9.5 million barrels of crude oil per year. In 2008, that meant $800 million went into the Indiana, Illinois, and Kentucky economies. This money constitutes revenue in the Midwest economy to over 40,000 people and supports employment of over 14,000 in Illinois alone, and as many as 20,000 people in the tri-state area. Since none of the major oil companies operate in the Illinois Basin, CountryMark has emerged as the dominant purchaser of the area's crude. To support continued development of this American resource, CountryMark recently began partnering with local oil-producing companies to invest in additional well drilling.

CountryMark's operations employ 350 workers, nearly all in the rural economy of southwest Indiana and southeast Illinois. In Posey County, Indiana alone, nearly $27 million in wages and benefits are provided every year. These wages are over twice the local average and are paid mostly to hourly workers with little or no opportunity for other employment equivalent to CountryMark. In addition to the positive financial impact of CountryMark's crude purchases and payroll, the company placed over $200 million into the local economy for the purchase of other goods and services.

CountryMark's Cooperative System

Unlike most other fuel refiners, CountryMark is a cooperative business. CountryMark is owned and controlled by its member cooperatives that are in turn owned and controlled by individual farmers within our trade territory. CountryMark's Board of Directors is comprised of farmers. Over 100,000 farmers in Indiana, Michigan, and Ohio participate in these local cooperatives who own CountryMark. Each year, profits are distributed back to these farmers via the cooperative system. Over the past five years, CountryMark has returned over $90 million in cash to the member cooperatives. These distributions remain in local communities where the dollars support the local economy. This annual distribution of profits represents a critical financial connection between CountryMark, our member cooperatives, and the 100,000 farmer-owners that have equity in the cooperative system.

Beyond distribution of profits, CountryMark represents a significant capital investment by our regional farmer-owners. The ownership of gasoline and diesel manufacturing represents vital, vertical integration of farmer's production agriculture operations. This investment by CountryMark's farmer-owners represents a time-honored business model of joining resources for the common purpose of purchasing vital goods and services in a manner they simply couldn't do individually.

CountryMark's cooperative purpose is to produce wholesale gasoline and diesel fuel for retail sale through the local member farmer cooperative network. Due to this mandate, we have a unique mission compared to the conventional oil refineries in the country. This mission is the core meaning of farmer cooperative ownership. As said by one farmer, "When it is time for the combine to run, the fuel had better be available." This was never more apparent than during hurricanes Katrina and Rita early in the harvest season of 2005. At a time when much of our nation's refining capacity was crippled, every single farmer co-op member was able to get the fuel they needed to operate their farm equipment.

Simply put, CountryMark's cooperative purpose is to supply vital goods and services to farmers. CountryMark's mandate is to supply these fuel needs even when purely capitalistic market forces might dictate otherwise. The needs of our farmer-owners are our single organizing principle. CountryMark was created to exclusively meet these needs, and our cooperative ownership ensures fidelity and accountability to our farmer-owners, not external shareholders. As a result, our farmer-owners unquestionably rely upon CountryMark for goods and services necessary for production agriculture, profit sharing, and repurchase of ownership once the farmer retires from operation.

Impact of Cap-and-Trade Legislation

We are still reviewing the details of the Chairman's amendment released October 23, 2009, and the accompanying EPA analysis. Our remarks are focused on concerns that are intrinsic to any cap-and-trade system. Even though CountryMark has not had time to thoroughly understand all of the details of S. 1733, we do consider S. 1733's cap-and-trade regime problematic for the reasons we set out below.

As one of the country's smallest refineries, CountryMark has built a durable operation by disciplined capital spending, controlling operating costs, and providing value-added goods and services to our farmer-owner customers. Our efforts to provide value-added goods include providing products that are sustainable to our farmer-owner customers. Our decision to actively promote the adoption of renewable fuels was an example of this. In our view, the market for renewable fuels is strong over the next 10 years and beyond – if further development is allowed. Our customers want the supply of these fuels to increase, and CountryMark is evaluating ways to increase the distribution and production of renewable fuels.

CountryMark's distribution of renewable fuel was not inspired by a government mandate. Instead, CountryMark has been a long time proponent of ethanol blended gasoline, and the majority of our gasoline contains ethanol. In addition, CountryMark is a recognized leader in blending biodiesel. For a refinery of our size, location, and ownership, blending renewable fuels such as ethanol and biodiesel makes economic sense and is a prudent business decision. As America transitions to renewable fuels, CountryMark and our farmer-owners will be critical to the success of this transition.

Our experience provides an important message to Congress. CountryMark has been able to produce ethanol blended gasoline and provide biodiesel to our customers because we were free to invest our limited capital on strategic projects that stood on their own merits. This experience inspires a central criticism of cap-and-trade legislation. By requiring CountryMark to divert our finite capital to purchase allowances, the government has essentially taken away our ability to make positive decisions regarding the expansion of renewable fuels. Assuming the cost of allowances are not so great as to force us out of the market altogether, this diversion of our limited capital resources to the government will prevent us from making additional investments that promote renewable fuels.

The reality of a viable renewable fuels industry is that it will be regional in nature. Transportation of both renewable feed stocks and fuels will be vital in ensuring economic sustainability well into the future. Renewable fuels production will not develop along the lines of the centralized petroleum refining in the gulf coast, where crude oil is pumped or shipped vast distances to be refined. To keep the cost of bio-fuels low for consumers, efficiency will be important. Production facilities will need to be close to both the feed source and the product distribution network. CountryMark and our cooperative members are well positioned to participate in the regional renewable fuels industry. CountryMark is already a recognized leader in renewable fuels distribution in the nation. Cap-and-trade legislation will force an undue economic burden on CountryMark, forcing us out of the development of more renewable fuels. If this is allowed to happen, a key contributor to the future renewable fuels industry will be lost forever.

Our second concern of cap-and-trade legislation is that the refining industry is viewed as one-size-fits-all. The capital that is extracted from companies of CountryMark's size will have a negative impact. While we had annual sales of $1.3 billion in 2008, our net profits are exceedingly modest. In the past five years, our average annual net income has been $37 million. This pales in comparison to the large amounts of profit we hear discussed when the refining sector is discussed in Washington. While the large integrated oil producers and refiners may have made record profits in the billions, CountryMark and other small business refiners did not. We do not have the capital resources that the major, integrated producers and refiners have and, therefore, we cannot absorb liabilities such as those embodied in carbon credit purchases and continue to conduct our business undisturbed.

These differences are important in understanding how any cap-and-trade regime will impact the market in which a small business refiner exists. There are important structural differences between refiners in the market place that will bear on the relative impacts. Our markets are priced in the tenths of a penny and are extremely price elastic – two tenths of a cent can push a product out of the market. CountryMark competes with much larger multinational, integrated oil companies with substantial earnings from oil production, petrochemical manufacturing, and other highly diversified operations. With multiple production stages at which to off-load costs, vertically integrated producer/refiners have pass through options that could lead to their fuel prices being below those of small business refiners with few or no off-load options.

CountryMark, like all small business refiners, is not a vertically integrated company. We do not own our own production like many large companies. To provide perspective, CountryMark represents 0.15 percent of the total U.S. refining industry's capacity. However, cap-and-trade legislation as drafted provides no meaningful distinction between these large, multinational companies and very small, farmer-owned companies like CountryMark. If the cap-and-trade legislation passes without recognition of the different structural and financial capabilities of these two segments of our industry, the first casualty will be companies such as CountryMark that today are one of only a few petroleum refiners providing 100% American energy to the marketplace.

Thirdly, cap-and-trade legislation is the single biggest threat to the viability of CountryMark, the investment of our farmer cooperative owners, and the survivability of the cooperative system. CountryMark's analysis of the mechanics of cap-and-trade show that the cost of carbon allowances far exceeds our capital resources by a huge margin. The costs are nearly insurmountable. As a result, we must choose to either absorb the costs of purchased carbon allowances or pass these costs to our customers. Our latest estimate is that the cost of carbon taxes on CountryMark will exceed $100 million per year for both our direct manufacturing emissions and emissions produced from consuming our product. This burden, compared to our average annual net income over the past five years of $37 million per year, clearly indicates the magnitude of the current legislation's impact on our economic sustainability.

Passing these costs along to our customers presents equally difficult choices. Our farmer-owner customers already operate on very thin margins. The added fuel inputs costs are likely to outstrip their operating margins in the first year of any cap-and-trade regime.

If required to purchase allowances exceeding $100 million per year CountryMark could be rendered insolvent. The end of CountryMark as a business would not only deprive our Midwest economy of the investments described above, but would even more significantly, seriously impair our local farmer-owned cooperatives' balance sheets. The insolvency of CountryMark would trigger a cascade of financial doubt through the farmer cooperative system. CountryMark bankruptcy would require the write down of currently viable assets on the cooperative system's books. Local cooperatives, which in turn would be impacted by the loss of equity, would see their ability to borrow money, at a time of economic stress due to volatile input prices, undermined. The violence of these economic forces could drive local cooperatives out of business, which in turn would significantly impair farmer's ability to pursue their livelihood. As a result of this cascade, the currently drafted climate change legislation threatens the basic farmer cooperative system.

Such a financial series of events would have far-reaching consequences for production agriculture and our national economy and must be avoided. CountryMark bankruptcy and the financial damage to our farmer cooperative system will not be the end of the impacts felt on our nation's future. The survivability of the farmer cooperative system, and CountryMark, is vital to the development and implementation of future renewable fuels.

Another concern of cap-and-trade legislation is that as currently drafted it will inadvertently reduce the quantity of diesel fuel available to the marketplace. Current renewable fuels focus on increasing availability of ethanol fuels to replace petroleum-based gasoline. Similarly, nearly all of the federal Renewable Fuel Standard is focused upon ethanol as a replacement for gasoline. However, the commercial viability of a suitable diesel fuel replacement is years behind the ethanol curve. Furthermore, renewable fuels standard regulations virtually eliminate the viability of increasing the use of soy-based diesel fuels because of the alleged impact on worldwide land use changes.

Today, there is no comparable technology to produce enough renewable diesel fuel to replace the large volumes of diesel fuel now used within the nation's economy. By raising the cost of petroleum gasoline through cap-and-trade, less of it will be consumed. This will reduce crude throughput rates in the nation's petroleum refineries, necessarily reducing the co-production of conventional diesel fuel. This will disproportionally increase diesel fuel prices, significantly impacting diesel-consuming industries such as U.S. production agriculture. In the end, this legislation will increase the cost and decrease the supply of diesel fuel that is vital to our rural economy and negatively impact the local family farms that Americans are counting on to supply the renewable bio-based feed stocks for the renewable fuel industry.

Additionally, cap-and-trade legislation disadvantages domestic refiners when compared to foreign competition. The petroleum industry is currently at very low utilization rates which are causing temporary and permanent shutdowns of American refineries. Even though domestic refineries are shutting down due to high supply and low margins, finished products such as gasoline and diesel fuel continue to be imported into country. A cap-and-trade system will increase the production costs for domestic refineries and further erode refining margins. Specifically, refiners are required to purchase allowances for both their facility carbon emissions and those for the combustion of their refined products. Facility carbon emissions make up 10-25% of the total requirement for a given refiner. Even though imported diesel and gasoline products will require allowances, foreign refineries may not have similar cap-and-trade requirements for their refining operations. Therefore, they will have an economic advantage of up to 25% over domestic refiners. This will lead to additional shut-ins of domestic refineries and the unintended consequence of increasing reliance not only on foreign crude oil but also foreign refined finished products.

Lastly, when these consequences are combined, the cumulative impact of a cap-and-trade regime on CountryMark is to fundamentally shift the terms upon which our future is decided. Our survival and growth to this point has been based on our expertise in refining, understanding of our farmer-owner customers, and the agriculture economy. Under a cap-and-trade regime, the importance of our expertise to our long term survival is vastly diminished. Instead of relying on the knowledge and business sense we've developed over 80 years, we will be compelled to gamble our future on skills we don't have – trading insights, hedge strategies, market leverage, credit strategies, etc. These are the skills and expertise that cap-and-trade legislation elevates to dominate our future success or failure. We think it is unfair to disturb the economy so profoundly as to alter through legislation the basic proposition under which our markets have operated successfully for decades. We have survived by being good at running a farmer-owned refinery. Cap-and-trade will destroy that proposition in favor of survival of companies who have good hedge skills, large capitol reserves to gamble in the commodities market and fortuitous credit strategies.

CountryMark urges Congress to reject this legislative proposal and re-think the important strategies needed for this nation to reduce its carbon emissions, develop viable renewable gasoline and diesel fuels, and avoid destruction of critical aspects of our economy in the process. The legislation as currently drafted does not achieve these goals. Instead, the legislation has the potential to drive all-American companies such as CountryMark out of business. However, the goals are achievable through a transparent and practical dialogue with small business refiners such as CountryMark and America's Production Agriculture Industry.

CountryMark.

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October 30, 2009

Senate Committee on Environment and Public Works
Attention: Heather Majors
410 Dirksen Senate Office Building
Washington D.C. 20510

I sincerely appreciate the opportunity to appear before the committee on October 29, 2009 and provide CountryMark's perspective on S. 1733, "Clean Energy Jobs and American Power Act." Below are the answers to the follow-up questions provided by Senator Inhofe to be included in the hearing record.

1) You said in your testimony that CountryMark's decision to actively promote the adoption of renewable fuels was a not inspired by a government mandate, but were a prudent business decision. Do you think that your business decisions are superior to government decisions about renewable fuels?

   CountryMark has actively participated in the renewable fuels business for many years. We became leaders in biodiesel by selling the positive attributes of the fuel. It was a value proposition that resonated in our marketplace along with products produced from all-American crude oil. Our experience and apparent success show that we understand our marketplace and what is needed to promote the production and distribution of quality renewable fuels. Cap-and-trade will increase CountryMark's costs by an estimated $100 million per year which will go to the government. CountryMark believes that this money could be used to further promote renewable fuels especially renewable diesel. Our farmer owners primarily need diesel fuel for their production agriculture activities.

   CountryMark's cooperative purpose is to supply vital goods and services to farmers. CountryMark's mandate is to supply these fuel needs even when purely capitalistic market forces might dictate otherwise. The needs of our farmer-owners are our single organizing principle. CountryMark was created to exclusively meet these needs, and our cooperative ownership ensures fidelity and accountability to our farmer-owners, not external shareholders. We understand the needs of these farmer-owners and ultimately can decide how to spend our limited capital based on these needs and our marketplace. Government intervention through a cap-and-trade system will actually stifle CountryMark's efforts to meet the growing need for increased production and distribution of renewable fuels.

2) You said in your written testimony that there was a diesel shortage on the horizon if this bill becomes law; please explain how this is true?

   Cap-and-trade is structured to increase the cost of petroleum based fuels. As the cost of these fuels increase, demand will decrease. Compared to diesel fuel, gasoline makes up a larger portion of the fuels industry in the United States. Current legislation promotes the production of electric cars and the proposed renewable fuels standard promotes cellulosic ethanol. Both of these are geared toward the replacement of gasoline. As the need for petroleum gasoline is reduced in the marketplace and the cap on emissions is reduced, refiners will be forced to reduce crude production because there will be an oversupply of gasoline.

   Domestic refining has limited ability to switch between gasoline and diesel production without significant capital expense. As a result, as crude throughput is reduced, diesel fuel which is essentially a by-product in the nation's refining industry will also be reduced. Combined with the fact that there is no comparable technology to produce enough renewable diesel fuel to replace the large volumes of diesel fuel now used within the nation's economy will result in a diesel shortage. This is a major concern for our farmer-owners who need diesel fuel in the production agriculture and mass transportation activities. Costs will skyrocket due to low diesel fuel supply similar to mid-2008. Since renewable diesel technology is limited at this time, adequate volumes to replace petroleum diesel are 5-10 years away. Diesel fuel drives this country – it plows out fields, transports are children to school, and delivers our goods to market. CountryMark believes cap-and-trade as written will result in the unintended consequence of a diesel fuel shortage. Legislation should recognize this possibility and provide a means to promote adequate supply of renewable diesel fuel.

3) You say in your written and oral testimony that "insolvency of CountryMark would trigger a cascade of financial doubt through the farmer cooperative system." Please explain.

Cap-and trade legislation will require CountryMark to pay over $100 million per year to the government for allowances. Compared to our average annual net income for the past 5 years of $35 million, we do not see how our farmer owned cooperative survives. Cap-and-trade legislation as written could make CountryMark insolvent. CountryMark insolvency would trigger a cascade of financial doubt through the farmer cooperative system. CountryMark bankruptcy would require the write down of currently viable assets on the cooperative system's books. Local cooperatives, which in turn would be impacted by the loss of equity, would see their ability to borrow money, at a time of economic stress due to volatile input prices, undermined. The violence of these economic forces could drive local cooperatives out of business, which in turn would significantly impair farmer's ability to pursue their livelihood. As a result of this cascade, the currently drafted climate change legislation threatens the basic farmer cooperative system.

Legislation should not include cap-and-trade provisions. If cap-and-trade is included, then farmer-owned cooperatives such as CountryMark should be exempt from these provisions due to the extensive negative impact on our 100,000 farmer-owners.

Sincerely,

Matthew L. Smorch
Vice President - Strategic Planning
CountryMark Cooperative, LLP

Senator BOXER. Thank you. I am going to talk to you more about that small business situation, Mr. Smorch, because I think we are trying to work on that.

Now, Mr. Cicio. That is easy. Let me tell a little bit about you, sir. Paul Cicio is the President of Industrial Energy Consumers of America. He has been invited by the minority, but we welcome you.

Mr. CICIO. Thank you.

Senator BOXER. He has been President of the Industrial Energy Consumers of America. He was appointed to a number of Federal commissions and other bodies during the Bush administration, including the Energy Markets Advisory Committee, the U.S. Department of Interior Outer Continental Shelf Advisory Committee, and the National Coal Council.

We welcome you.

STATEMENT OF PAUL CICIO, PRESIDENT, INDUSTRIAL ENERGY CONSUMERS OF AMERICA

Mr. CICIO. Thank you. Thank you, Chairman Boxer, Ranking Member Inhofe, and members of the committee. My name is Paul Cicio, and I am the President of the organization. We are unique organization in that all member companies are manufacturers and we are all energy intensive, and they come from all segments of the economy.

IECA supports cost effective action so long as it does not impair our competitiveness. A long list of policy recommendations is included in our written testimony.

Unfortunately, S. 1733 would impact our competitiveness. It would increase the price of natural gas, electricity, and transportation fuel costs substantially. Increased job losses, it will lower capital investment in manufacturing. It will impede increased production of manufactured goods, impede exports, and increase imports.

Madam Chairman, the U.S. manufacturing sector has lost 5.4 million manufacturing jobs over the last 10 years. That is 43 percent of all manufacturing jobs. Of the members of the committee, I am going to just list from your States the top five job losses in manufacturing. California, unfortunately, is at the top of the list with the loss of 475,000 jobs in 10 years; Ohio, 370,000 jobs lost; New York, 265,000 jobs; Pennsylvania, 262,000; Tennessee, 168,000; and New Jersey, 146,000. The average job loss on a percentage basis of this committee, looking at all of your States, is a loss of 26 percent of all your manufacturing jobs in 10 years.

Manufacturing output and investment per GDP has fallen consistently, and imports have risen sharply. Approximately 40,000 manufacturing plants have been closed in the last 7 years. We have lost 11 industries that we were once dominant in, and by the end of last year we were dealing with trade imports that exceeded exports.

S. 1733 includes provisions that provide declining allowances for energy intensive and trade exposed manufacturing sectors. This is a good thing. It is helpful. But this will not preserve the competitiveness of these companies, and unfortunately it will impair growth. These industries will be fully exposed to higher energy costs that could be substantial. Major questions exist about how many of these companies and industries will receive free allowances and what those will mean in terms of cost abatement.

Given the costs of S. 1733, it will be necessary that a border adjustment provision be included, and they need to take place at the beginning of the compliance period. However, IECA wants the Congress to know that border adjustments at large are not acceptable policy, and they will not work effectively. They will not stop imports of energy intensive products, and they will cause reciprocity of our trading partners, and they will distort trade. And this is not inconsequential. This issue by itself is reason not to use cap and trade that impose costs on the manufacturing sector.

A simple example of why border adjustments will not be effective is illustrated with aluminum, a very electricity intensive product. A Chinese producer of aluminum when confronted with the threat of paying a border adjustment carbon fee will simply start producing the product that uses the aluminum and import that. So they will be importing instead of the bulk aluminum, it will be the aluminum wheels. It will be the aluminum auto parts. It will be the aluminum aircraft parts, and so on and so forth. And that description applies to all energy intensive products.

Last, IECA is deeply concerned that S. 1733 will immediately drive up the price of natural gas. We talk to a lot of the electric utilities. We consistently come up with a number that the utilities will be short some 400 million metric tons of carbon starting in 2012. And there is no way in those 2 years to use carbon capture and sequestration to offset that or nuclear. There is not scale enough in 2 years for renewable energy and for energy efficiency. So the only option that the utilities are going to have is natural gas.

Converting all 400 million metric tons would amount to a little over 4 trillion cubic feet of gas. It is a significant increase. The highest increase in natural gas production that the U.S. producers have been able to provide is a .5 trillion cubic feet per year increase. So it is question of scale.

When prices of natural gas goes up, it also drives the price of electricity up as well.

Thank you.

[The prepared statement of Mr. Cicio follows:]

TESTIMONY OF

PAUL N. CICIO

INDUSTRIAL ENERGY CONSUMERS OF AMERICA

BEFORE THE

SENATE ENVIRONMENT AND PUBLIC WORKS COMMITTEE

ON

"LEGISLATIVE HEARING ON S.1733, CLEAN ENERGY JOBS AND AMERICAN POWER ACT"

OCTOBER 29, 2009

WASHINGTON, DC

Chairman Boxer, Ranking Member Inhofe, thank you for the opportunity to testify before the Senate Environment and Public Works Committee on S.1733 the Clean Energy Jobs and Power Act of 2009.

The Industrial Energy Consumers of America is a nonpartisan association of leading manufacturing companies with $900 billion in annual sales and with more than 850,000 employees nationwide. It is an organization created to promote the interests of manufacturing companies for which the availability, use and cost of energy, power or feedstock play a significant role in their ability to compete in domestic and world markets. IECA membership represents a diverse set of industries including: plastics, cement, paper, food processing, brick, chemicals, fertilizer, insulation, steel, glass, industrial gases, pharmaceutical, aluminum and brewing. Each of these industries is either significant consumers of natural gas or electricity or both.

IECA supports cost-effective climate action so long as it does not impair competitiveness. S.1733 is not cost-effective and would: reduce competitiveness, increase natural gas, electricity and transportation fuel costs, increase job losses, lower capital investment in the manufacturing sector, impede increased production, impede exports and increase imports.

The US manufacturing sector has lost over 5.1 million jobs in the last 10 years. Output and investment per GDP has fallen consistently and imports have risen sharply. (See charts below) This is not the time to implement risky unproven climate policy. The US economy cannot afford to lose any more jobs or shutdown facilities. Approximately 40,000 manufacturing plants have closed during the seven years ending in 2008. We have lost eleven industries that we were once dominant since the late 1990s. By late 2008, the US trade deficit with China alone was running at close to $1 billion per day, amounting to more than $90 per month or more than $1100 per year for every American. As you can see, US manufacturing is significantly at risk.

Congress can achieve significant GHG reductions thru energy efficiency, the acceleration of the use of existing technology and investment in low carbon energy. Cap and trade is not needed to achieve any of these objectives. Examples include expanded use of CHP and recycled energy, energy efficiency improvement thru energy efficiency tax credits and improving energy efficiency in buildings. S.1733 does not adequately address these areas. Commercial and residential buildings consume 40 percent of our nation's total energy and over 70 percent of our nation's electricity and account for 405 million metric tons of GHG emissions. Driving energy efficiency in new and existing commercial and residential buildings must be a critical part of any meaningful national energy/climate policy. Codes, standards and incentives that will ensure that our buildings are significantly more efficient must be included in public policy that decreases energy consumption and reduces emissions. Energy efficiency products and technologies are major job creators. Many of these products, like insulation, windows and cool roof shingles are virtually 100 percent US-job centric from raw materials, supply chain, manufacturing, distribution all the way to their installation.

S.1733 includes provisions that provide declining allowances for the energy intensive and trade exposed manufacturing sectors. While helpful, this will not preserve the competitiveness of these companies and will not allow for growth. These industries will be fully exposed to higher energy costs that could be substantial. Major questions exist as to how many companies and industries will be eligible for free allowances, and how many allowances they will need. Such considerations make clear that American companies will face new costs – likely significant new costs – in the short term.

While this provision partially addresses the needs of the energy intensive and trade exposed manufacturing facilities which comprise about 7000 facilities, they do nothing to protect the competitiveness of some 350,000 other manufacturing facilities. As energy costs goes up, almost all of these other manufacturers will become less profitable and susceptible to competition from imports and further job losses. Almost any product produced in the US can be produced offshore and imported.

Climate legislation should not be constructed such that border tariffs and adjustments are required to prevent imports of energy intensive product from countries that do not have similar GHG reduction costs. S.1733, because of higher energy and compliance costs imposes such measures upon the manufacturing sector. Given the costs of S.1733, it will be necessary that a border adjustment provision be included and they need to be in place at the beginning of the compliance period. However, IECA wants Congress to know that border adjustments at large, are not acceptable policy, will not work effectively (will not stop imports of energy intensive products) and will cause reciprocity by our trading partners and distort trade. This is not inconsequential. This issue, by itself, is reason not to use cap and trade that impose costs on the manufacturing sector.

A simple example of why border adjustments will not be effective is illustrated with aluminum, a very electricity intensive product. A Chinese producer of aluminum, when confronted with the threat of paying a border adjustment carbon fee will simply start producing the products that "uses" the bulk aluminum. Instead of importing the aluminum ingots, it will import aluminum auto wheels, aluminum auto fenders or aircraft parts. For glass, instead of bulk glass the foreign company imports glass bottles. The same applies to all of the energy intensive industries.

IECA does not support international "sector agreements" that call for trading and crediting between manufacturing companies in the same sector globally because it will result in companies from the US subsidizing GHG investments in our competitors facilities located in developing countries. S.1733 and HR 2454 both contain placeholders for such agreements.

IECA is deeply concerned that S.1733 will immediately and significantly drive up the demand and price for natural gas and electricity. Many in the electric power sector calculate that their industry will be short over 400 million metric tons of CO2e as the program starts in 2012. The 400 million ton short fall is based upon the lower EPA GDP growth numbers for the US economy to 2030. Using last year's higher EPA GDP forecast would result in about an 800 million ton CO2e shortfall. Between now and 2012 is insufficient time for the power sector to decrease carbon emissions thru the use of carbon capture and sequestration, nuclear, domestic or international carbon offsets, energy efficiency or renewable energy. Their only alternative is to use natural gas.

For perspective, if the electric power sector uses natural gas to displace coal to achieve 100% compliance, it would consume the equivalent amount of natural gas of about 4.6 TCF or roughly a 70 percent increase above 2008 power industry consumption. The largest increase in domestic production was only a 3% increase from 2006 to 2007. Clearly, the ability to rapidly increase production of natural gas to meet even a small portion of this potential demand does not exist. Furthermore, because natural gas fired power generation sets the marginal price of electricity in a growing portion of the US, as natural gas prices go up, so will the price of electricity to every homeowner, farmer and manufacturer.

The manufacturing sector emissions are low relative to other sectors, in part because we have consistently invested in energy efficiency and GHG reductions. We did the right thing, yet S.1733 fails to broadly recognize and provide GHG credits for these reductions. It also does nothing to reward companies for CHP and recycled energy. Companies with CHP and recycled energy should receive credit for the difference in carbon emissions/kwh from their electric generation compared to that of the utility had they purchased the power.

Given the Endangerment Finding, IECA encourages the Congress to act to deal legislatively to address this regulatory conflict. Manufacturers do not want the EPA to regulate GHG emissions under the Clean Air Act (CAA). The Clean Air Act was never intended to regulate carbon emissions. That being said, Congress needs to advance non-cap and trade legislation that is cost effective, does not impair competitiveness and removes the potential for regulation under the CAA.

Because the manufacturing sector competes globally, it is essential that all manufacturing globally have similar climate policy, costs and timing of implementation. When a manufacturer from a developing country decides to compete in international commerce, such companies should not have any developing country UNFCCC Kyoto climate protections. The US manufacturing sector often faces unfair competition from companies who are from developing countries. The differences in costs structures between a US versus foreign producer can be very significant. Many of these companies are owned by their government. Foreign producers receive energy subsidies, tax abatements, free buildings and sometimes do not pay taxes. Their costs are also lower because they do not pay social security, workman's compensation, disability, health care or match 401K contributions. We encourage the Congress to understand that many US companies are at a cost threshold that is making it very difficult to sustain their business let alone bare additional costs due to climate regulation. Climate legislation must be cost effective and not negatively impact competitiveness.

S. 1733 is too risky economically - especially for the manufacturing sector. The legislation assumes that a lot of things that have never been done before - can be achieved. This creates enormous risk - and this risk will be shifted to every consumer of energy.

The legislation makes a lot of assumptions that would potentially lower the cost of the legislation. Importantly, all of the assumptions have ever been done before. Example include:

- Requiring reductions at 20% below 2005 levels by 2020 without an abundant and affordable supply of low carbon energy.
- Relying on domestic and international offsets will be abundant and low cost. Developing a new supply of 1.5 - 2.0 billion tons of offsets.
- Assuming that CCS technology will be commercialized and cost-competitive in less than 10 years.
- Assuming that carbon can be traded on primary and secondary markets without excessive speculation. We have still not been able to reduce excessive speculation in existing commodity markets.
- Assuming that electric utilities can reduce their GHG emissions to 3% below 2005 by 2012 and not result in massive fuel switching to natural gas, driving up the price of natural gas and electricity.
- Assuming that you can provide allowances for CO2 compliance costs to EITI sectors and not reimburse for higher energy costs and not expect job losses.
- Assuming the Congress does not have to do anything to protect 350,000 manufacturing facilities from higher GHG and energy costs without their losing competiveness.

Climate legislation is a federal, not state regulatory issue. Imposing both federal and state regulations on the manufacturing sector will result in higher un-necessary costs of compliance and not achieve additional GHG reductions. S.1733 does not preempt regional, state and local registry requirements and reduction goals.

Recommendations to reduce GHG emissions

Below are several very important steps that can be taken by congress that will result in significant GHG reductions without use of cap and trade and can be acted upon immediately.

Establish a 10 percent energy efficiency credit for manufacturing for a period of 10 years that is applicable to all fossil fuel and electricity consuming equipment

Increase performance standards on electricity and fossil fuel consuming devices

Setting higher energy efficiency standards for industrial equipment and technology associated with consumption of electricity or fossil fuels is cost effective and will provide a sustained long term improvement GHG reductions. This also has the effect of setting performance standards for imported products that will compete for US business. Just as regulations have and are being promulgated to improve appliance standards, the same can be done with industrial equipment. As companies do maintenance on existing facilities or build new facilities, more energy efficiency equipment will be utilized.

Mandate an increase in utility purchases of electricity from manufacturing and commercial building recycled energy and combined heat and power (CHP) projects

A December 1, 2008 Department of Energy report entitled "Combined Heat and Power – Effective Energy Solutions for a Sustainable Future" indicates that if the US increases CHP capacity from 9 percent to 20 percent of the grid by 2030, we can avoid 60 percent in the growth of US GHG emissions. Doing so also will increase the competitiveness of the manufacturing sector and increase jobs. To achieve this requires removing economic and market barriers at the federal and state levels.

Jump start the clean industrial revolution by creating a industrial sector low-cost loan program

Increased productivity and energy efficiency occurs when companies invest in existing or new facilities. Companies rarely invest during economic down turns like we are seeing today because there is uncertainty in the near-term return on investment. And, unless we act, the job creation will not occur. The solution is the development of a clean industrial revolution program that allows companies to borrow money from the Treasury at low interest rates, not require payment for four years and give ten years to pay it back. Not requiring payment for four years overcomes the short term concerns of a short term return on investment. Unlike some other business tax incentives, this program requires the investment be made in the US creating maximum benefit for the country.

Increase the Investment Tax Credit for Recycled Energy and Combined Heat and Power

Improve the applicability of the investment tax credit for waste energy and CHP projects by extending the 10% ITC.

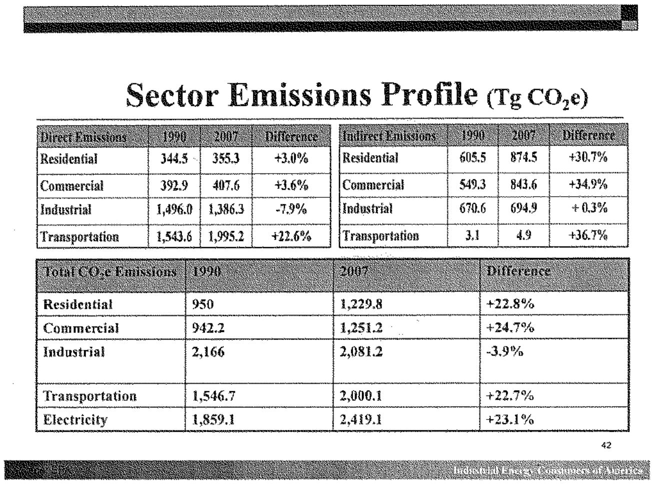
Increase depreciation rates for all manufacturing sector capital assets to increase cash flow

Most assets fall under a depreciation schedule of 15-20 years. We recommend it be accelerated to 7 years.

Establish federal energy efficiency standards for existing and new homes and commercial buildings

Buildings consume 40 percent of US energy and they last for 80 to 100 years yet there is no federal requirement for consistent energy efficiency improvement. We support federal energy efficiency improvement standards set through collaboration with state governments.

(Charts are listed below)



Sector Emissions Profile (Tg CO_2e)

Direct Emissions	1990	2007	Difference
Residential	344.5	355.3	+3.0%
Commercial	392.9	407.6	+3.6%
Industrial	1,496.0	1,386.3	-7.9%
Transportation	1,543.6	1,995.2	+22.6%

Indirect Emissions	1990	2007	Difference
Residential	605.5	874.5	+30.7%
Commercial	549.3	843.6	+34.9%
Industrial	670.6	694.9	+ 0.3%
Transportation	3.1	4.9	+36.7%

Total CO_2e Emissions	1990	2007	Difference
Residential	950	1,229.8	+22.8%
Commercial	942.2	1,251.2	+24.7%
Industrial	2,166	2,081.2	-3.9%
Transportation	1,546.7	2,000.1	+22.7%
Electricity	1,859.1	2,419.1	+23.1%

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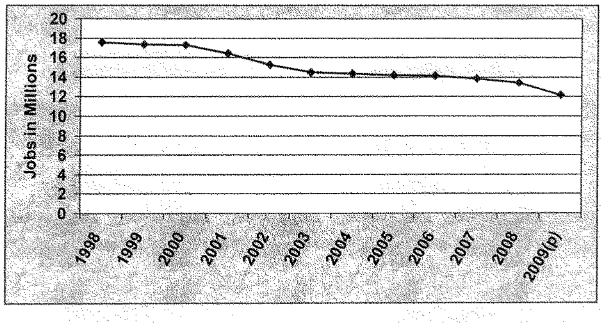
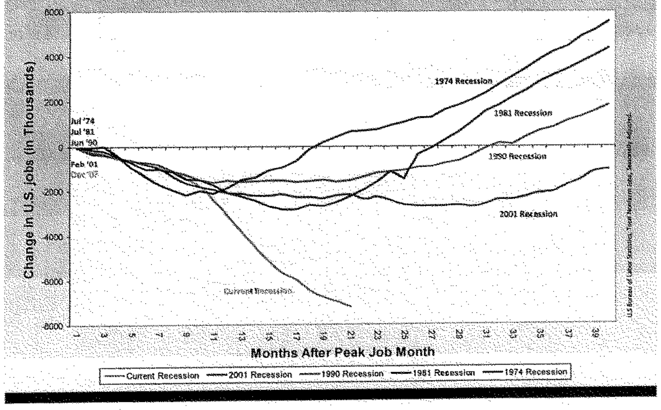
Industrial Energy Consumers of America

National Manufacturing Jobs
1998-2009 Net Job Loss=5.41 Million Jobs

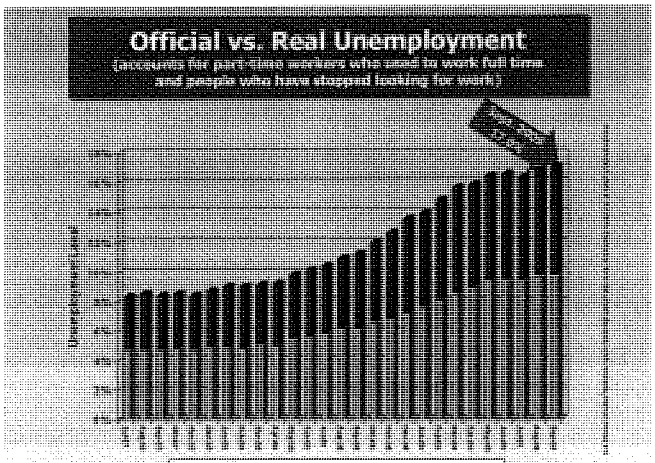


Source: Bureau of Labor Statistics

Job Losses in Recent U.S. Recessions

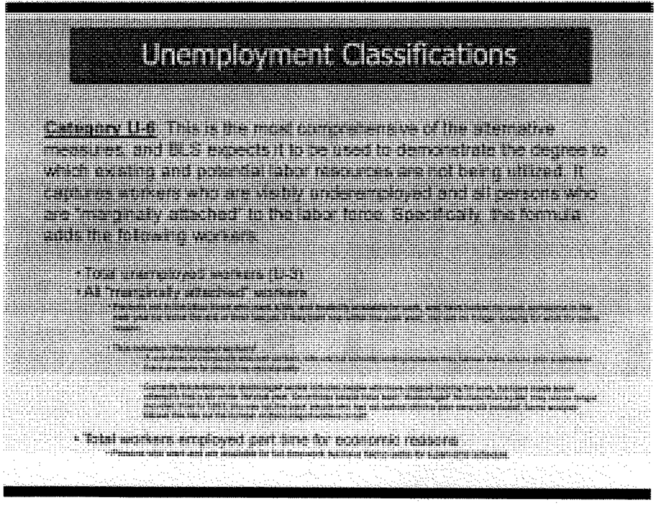


U.S Bureau of Labor Statistics, Total Nonfarm Jobs, Seasonally Adjusted.



Official vs. Real Unemployment

(accounts for part-time workers who used to work full time and people who have stopped looking for work)



Unemployment Classifications

Category U-6: This is the most comprehensive of the alternative measures, and BLS expects it to be used to demonstrate the degree to which existing and potential labor resources are not being utilized. It captures workers who are visibly underemployed and all persons who are "marginally attached" to the labor force. Specifically, the formula adds the following workers:

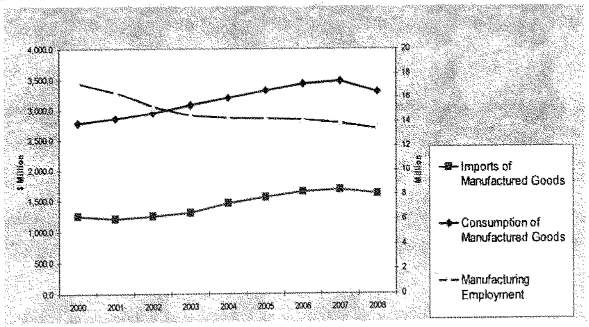
- Total unemployed workers (U-3)
- All "marginally attached" workers
  - [illegible]
  - [illegible]
- Total workers employed part time for economic reasons
  - [illegible]

Unemployment Classifications

Category U-3: This is the official unemployment number, the formula for which has been largely unchanged since 1940, and represents the total unemployed, as a percent of the civilian labor force. For this category, if you did any work at all during the reference week, you are considered employed. If you did no work, but searched for a job sometime in the 4 weeks prior to the survey, you are "unemployed."

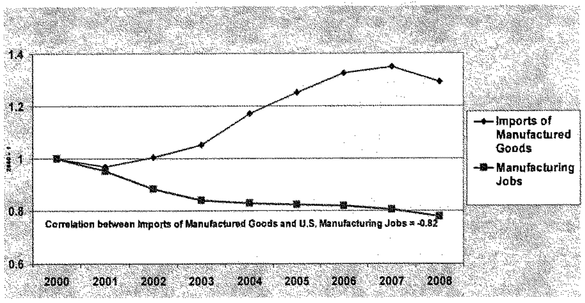
If you do not meet either test, you are "not in the labor force."

Manufacturing, Imports, and Employment



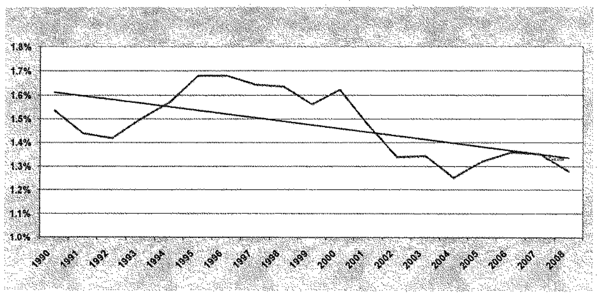
Industrial Energy Consumers of America

Imports and Employment in Manufacturing, 2000 - 2008

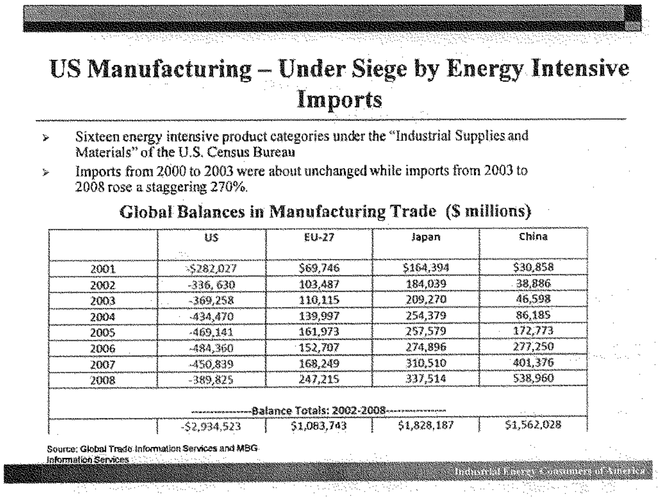


Industrial Energy Consumers of America

Investment in Industrial Equipment as Percent of Real GDP 1990-2008



Industrial Energy Consumers of America



US Manufacturing – Under Siege by Energy Intensive Imports

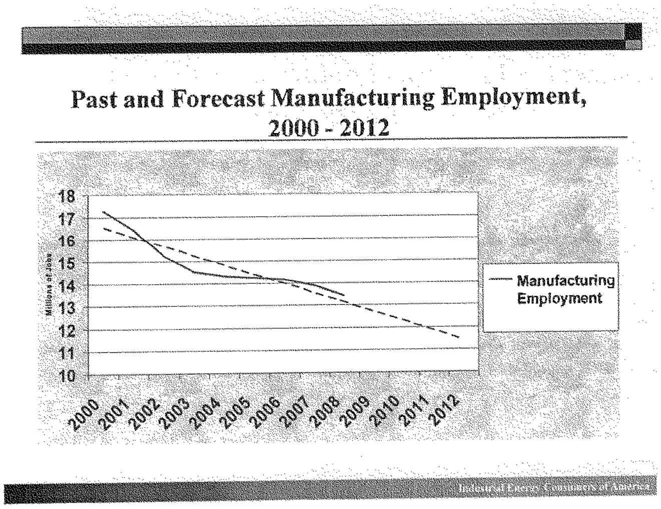
- Sixteen energy intensive product categories under the "Industrial Supplies and Materials" of the U.S. Census Bureau
- Imports from 2000 to 2003 were about unchanged while imports from 2003 to 2008 rose a staggering 270%.

Global Balances in Manufacturing Trade ($ millions)

	US	EU-27	Japan	China
2001	-$282,027	$69,746	$164,394	$30,858
2002	-336, 630	103,487	184,039	38,886
2003	-369,258	110,115	209,270	46,598
2004	-434,470	139,997	254,379	86,185
2005	-469,141	161,973	257,579	172,773
2006	-484,360	152,707	274,896	277,250
2007	-450,839	168,249	310,510	401,376
2008	-389,825	247,215	337,514	538,960
	----------------Balance Totals: 2002-2008----------------			
	-$2,934,523	$1,083,743	$1,828,187	$1,562,028

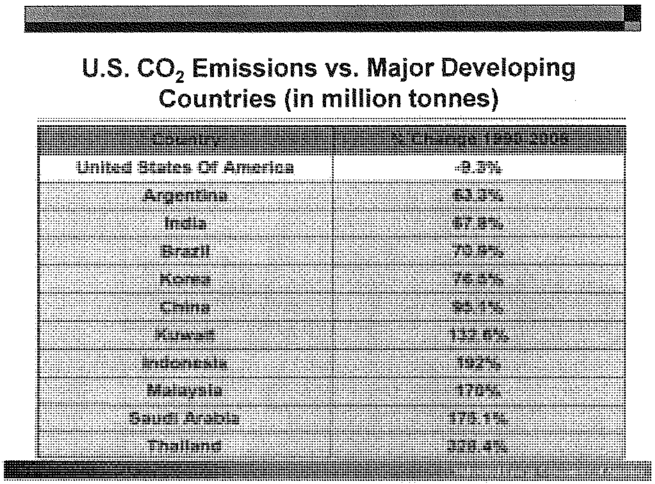
Source: Global Trade Information Services and MBG Information Services

Industrial Energy Consumers of America



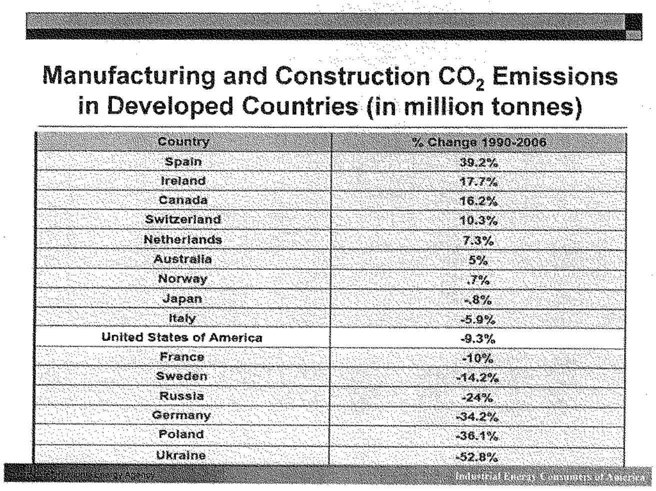
Past and Forecast Manufacturing Employment, 2000 - 2012

Industrial Energy Consumers of America



U.S. CO_2 Emissions vs. Major Developing Countries (in million tonnes)

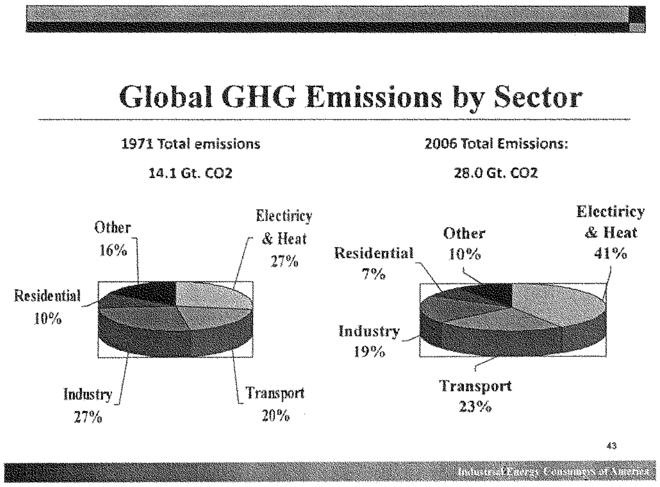
Country	% Change 1990-2006
United States Of America	-9.3%
Argentina	63.3%
India	67.8%
Brazil	70.9%
Korea	76.5%
China	95.1%
Kuwait	132.6%
Indonesia	192%
Malaysia	170%
Saudi Arabia	175.1%
Thailand	328.4%



Manufacturing and Construction CO_2 Emissions in Developed Countries (in million tonnes)

Country	% Change 1990-2006
Spain	39.2%
Ireland	17.7%
Canada	16.2%
Switzerland	10.3%
Netherlands	7.3%
Australia	5%
Norway	.7%
Japan	-.8%
Italy	-5.9%
United States of America	-9.3%
France	-10%
Sweden	-14.2%
Russia	-24%
Germany	-34.2%
Poland	-36.1%
Ukraine	-52.8%

Industrial Energy Consumers of America



Global GHG Emissions by Sector

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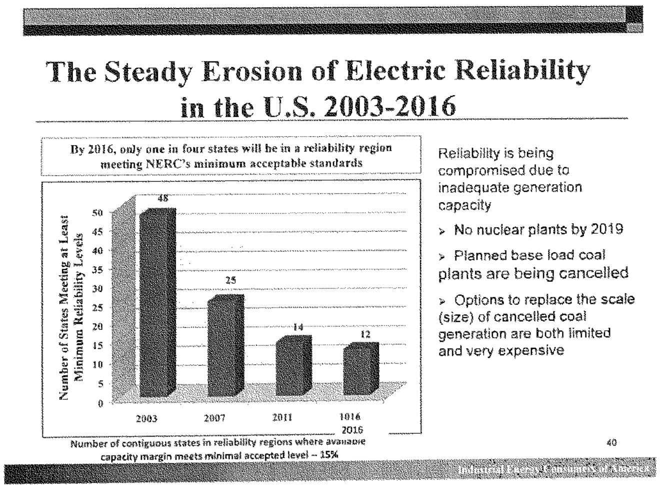
Industrial Energy Consumers of America



The Steady Erosion of Electric Reliability in the U.S. 2003-2016

By 2016, only one in four states will be in a reliability region meeting NERC's minimum acceptable standards

Number of contiguous states in reliability regions where available capacity margin meets minimal accepted level – 15%

Reliability is being compromised due to inadequate generation capacity

- No nuclear plants by 2019
- Planned base load coal plants are being cancelled
- Options to replace the scale (size) of cancelled coal generation are both limited and very expensive

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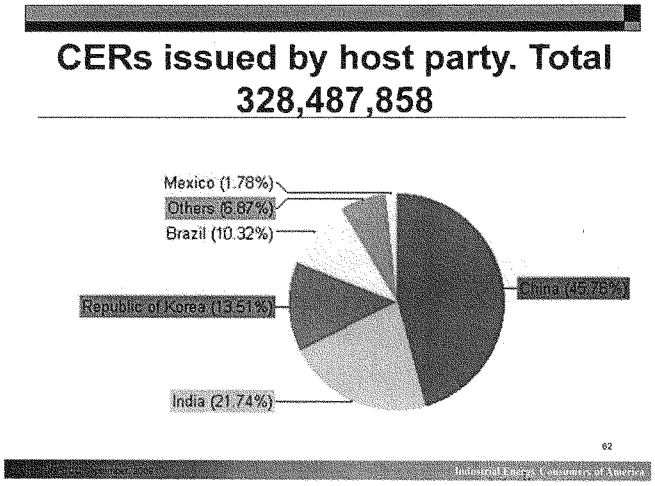
Industrial Energy Consumers of America



CERs issued by host party. Total 328,487,858

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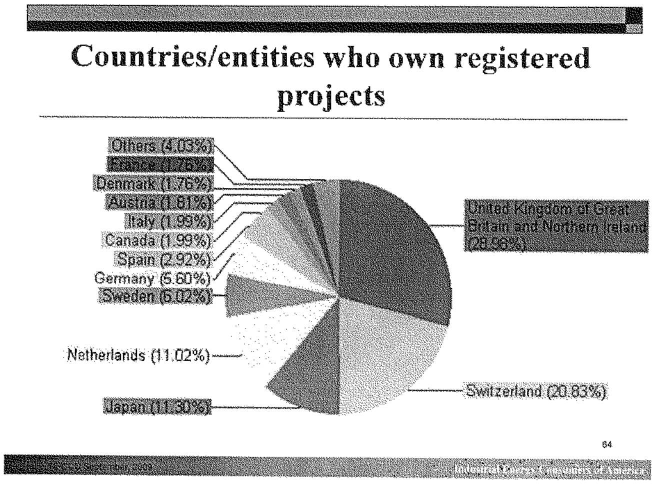
IECA September 2009

Industrial Energy Consumers of America



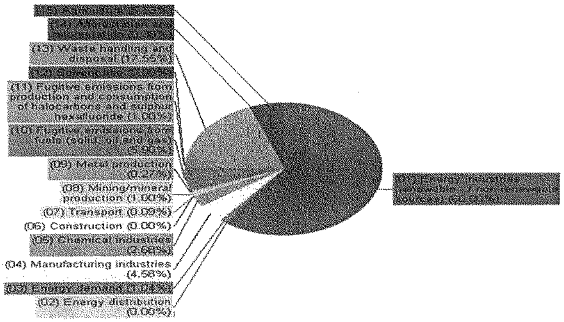
Countries/entities who own registered projects

64

IECA September 2009

Industrial Energy Consumers of America

Distribution of registered project activities by scope



Environment and Public Works Committee Hearing
October 29, 2009
Follow-Up Questions for Written Submission

Questions for Cicio

Questions from:

Senator Sheldon Whitehouse

1) As you know, there is broad support in the labor community – whom your member companies employ – for a domestic cap on carbon emissions, specifically for its potential to grow domestic jobs and provide long-term job security. In your testimony and during questions with Committee Members, you argued that establishing a domestic cap on carbon emissions would lead to manufacturing job losses in the United States. Given this discrepancy, can you please provide the following information related to recent manufacturing job losses and creation:

   a. In the last 10 years, without a domestic cap on carbon emissions in place, how many jobs have your member companies moved from the U.S. to foreign countries?

   b. In the last 10 years, how many jobs have your member companies created or lost in the U.S.?

   c. In the last 10 years, how many jobs have your member companies created or lost in foreign countries?

Answer:
The manufacturing sector competes globally and if our domestic energy costs go up for any reason and our competitors in foreign countries do not experience that same cost increases – we lose competitiveness – and lose jobs. Saying it another way, when our costs are not low enough, we do not get the customer's order for steel, paper, cement, aluminum or fertilizer products - the foreign company does and it creates jobs for them.

According to the National Association of Manufacturers (NAM), in general, US companies are at about a 17 percent cost disadvantage to foreign companies. It is much greater for some countries like China. The US Treasury is quoted as saying the Chinese manipulation of their currency gives their manufacturers a 40 percent cost advantage.

No one questions that S.1733 will not increase energy costs – it will. In fact, the entire theory behind placing a value on carbon assumes it will increase the price of energy and make shifts in the market.

IECA's testimony indicates that the manufacturing sector has lost 5.41 million jobs over the last ten years or so. While some of those jobs may have been lost to improved production processes, there is wide spread agreement that the failure to be competitive with foreign companies created most job losses.

As to your specific request about how many jobs IECA member companies have lost or moved offshore, IECA does not have such data. In fact, if we did, it would not be helpful in addressing your question *because IECA companies represent a small portion of the 350,000 manufacturing facilities and would not be representative of these industries at large.*

Senator George V. Voinovich
1) Mr. Cicio - Your testimony says that natural gas and electricity prices will rise quickly. Could you please explain why that will happen?

Many in the electric power sector calculate that their industry will be short over 400 million metric tons of CO2e as the program starts in 2012. The 400 million ton shortfall is based upon the lower EPA GDP growth numbers for the US economy to 2030. Using last year's higher EPA GDP forecast would result in about an 800 million ton CO2e shortfall. Between now and 2012 is insufficient time for the power sector to decrease carbon emissions thru the use of carbon capture and sequestration, nuclear, domestic or international carbon offsets, energy efficiency or renewable energy. Their only alternative is to use natural gas.

There is about 500,000 MW of existing natural gas fired power capacity available today and most of it is used for peaking power. This means the capacity is in place, no capital is needed to ramp up significant natural gas demand to meet their emission requirements.

For perspective, if the electric power sector uses natural gas to displace coal to achieve 100% compliance, it would consume the equivalent amount of natural gas of about 4.6 TCF or roughly a 70 percent increase above 2008 power industry consumption. The largest increase in domestic production was only a 3% increase from 2006 to 2007. Clearly, the ability to rapidly increase production of natural gas to meet even a small portion of this potential demand does not exist. Furthermore, because natural gas fired power generation sets the marginal price of electricity in a growing portion of the US, as natural gas prices go up, so will the price of electricity to every homeowner, farmer and manufacturer.

2) Mr. Cicio – Please explain why you feel that this bill's energy intensive trade exposed provisions will not protect the competitiveness of these industries. Also, your testimony says that the border adjustments provision will not work to prevent unfair competition from countries that do not have similar GHG reductions commitments. Please explain why.

S.1733 includes provisions that provide declining allowances for the energy intensive and trade exposed manufacturing sectors. While helpful, this will not preserve the competitiveness of these companies and will not allow for growth. These industries will be fully exposed to higher natural gas, electricity and transportation costs that could be substantial. Major questions exist as to how many companies and industries will be eligible for free allowances, and how many allowances they will need. Such considerations make clear that American companies will face new costs – likely significant new costs – in the short term.

While this provision partially addresses the needs of the energy intensive and trade exposed manufacturing facilities which comprise about 7000 facilities, they do nothing to protect the competitiveness of some 350,000 other manufacturing facilities. As energy costs goes up, almost all of *these other manufacturers will become less profitable and susceptible to competition from imports and further job losses. Almost any product produced in the US can be produced offshore and imported.*

Climate legislation should not be constructed such that border tariffs and adjustments are required to prevent imports of energy intensive product from countries that do not have similar GHG reduction costs. S.1733, because of higher energy and compliance costs imposes such measures upon the manufacturing sector. Given the costs of S.1733, it will be necessary that a border adjustment provision be included and they need to be in place at the beginning of the compliance period. However, IECA wants Congress to know that border adjustments at large, are not acceptable policy, will not work effectively (will not stop imports of energy intensive products) and will cause reciprocity by our trading partners and distort trade. This is not inconsequential. This issue, by itself, is reason not to use cap and trade that impose costs on the manufacturing sector.

A simple example of why border adjustments will not be effective is illustrated with aluminum, a very electricity intensive product. A Chinese producer of aluminum, when confronted with the threat of paying a border adjustment carbon fee will simply start producing the products that "uses" the bulk aluminum. Instead of importing the aluminum ingots, it will import aluminum auto wheels, aluminum auto fenders or aircraft parts. For glass, instead of bulk glass the foreign company imports glass bottles. The same applies to all of the energy intensive industries.

3) Mr. Cicio – In an earlier panel, I asked the panelists the following questions, and I'd like for you to answer them as well: "Would you please discuss the degree to which our new clean energy projects are being hampered by the time and cost posed by environmental regulations? Is there some common sense time frame that we should be expecting from environmental impact reviews? Is there something Congress should do to speed up these types of reviews? If China can accomplish these types of projects faster and cheaper now, how can we expect the U.S. to compete under a climate regime – particularly if China doesn't agree to emissions reductions as well?"

Many IECA member companies have experiences of attempting to do energy efficiency projects that must deal with Clean Air Act permits. The additional costs and time consumption to get thru the CAA permit process is reported to be substantial and has prevented projects from moving forward. Since China does not have such stringent and inflexible air permits, the cost and time to complete a project is significantly less.

Senator BOXER. Thank you, Mr. Cicio.

I am going to start off. I want to agree with what you said that this bill will have an impact on our competitiveness. It is going to make us competitive. It is going to make us the leader of the world. I would suggest you read Thomas Friedman's book, Hot, Flat and Crowded. Very important work, I think. He went to China and just saw, and he basically said to them, he was at a meeting. He testified here. It is a great story.

And he said to the leaders there, well, are you ready to help us get rid of the carbon? And they said, well, why should we do that? We want to grow like you grow. And he says, OK, fine, you just continue to grow the old way. We'll do it the new way, and you are going to lose the edge, and we are going to just clean your clock. At which point they sat up and said, oh, wait a minute. Let's talk about it. And we know that the country that does this is going to be the leader.

I also agree with you that the last 7 years were devastating during those Bush years. It was devastating for manufacturing. There is no question about it. You put it on the record.

Now, we know, finally we found out that as a result of a lot of efforts of our President and some of us here, a lot of us here, it looks like we have turned the corner in this recession. We can't be sure, but today we learned there is 3.5 percent GDP growth. We are very worried about unemployment because it is still a lagging indicator.

But I could tell you we also have deficits and debt, and we don't want to keep on thinking that we can cure all the problems. We need the money that Mr. Dolezalek is going to pour into these companies, the John Doerrs, the Brook Byers, the Silicon Valley, who came here and told us they are going to put, Mr. Cicio, twice the money they put into high tech and biotech combined into these clean energy companies.

So I agree with the way you laid your case, but I think your conclusion is completely the wrong one, which is status quo. Status quo is why we are losing all these jobs. Status quo is why we had the recession. Status quo is why we are losing our competitive edge.

In terms of our border adjustment, it is going to be WTO-compliant. Senator Baucus will see to that, that it will be WTO-compliant. And Senator Cardin is working to see if we can't work with our parliaments throughout the world to make sure there is one simple way to adjust for this.

So I just feel you laid the whole scenario out, but your conclusion is don't do this. And I say the status quo is killing us, and let's make this jump because if we do it, it is going to be the best thing.

Now, I think the other thing that is interesting is Mr. Smorch's testimony. Very important. That is why we work with colleagues to make sure that the small refiners got a huge break in this. They are going to get half—it is in the Chairman's mark—the bill dedicates almost half of the $1.6 billion per year reserve for refineries to small businesses like yours. We want to sit down with you. We want to show it to you. Also, small business refiners are delayed until 2015. The rest of the refineries come under the cap a year earlier.

So I would love to just get the chance to work with you on this because we have made a very strong distinction between the smaller refineries and the larger ones, and this is one that I have been involved in since I started to sit down and write the bill.

I have a question for I think it is Mr. Trisko. Do you believe the status quo will provide a sustainable future for coal dependent industries? Or will additional certainty be necessary to ensure a role for coal in America's future? In other words, I know you have some issues with the bill, and I respect that very much. And we are going to be working with you, believe me, as we get this bill through the floor.

But the status quo is trouble because the Clean Air Act is going to have to be implemented. And we think this gives so much more flexibility to everyone, and gives some help. So could you talk to me about that?

Mr. TRISKO. Madam Chair, that is a great question, and really describes concisely the quandary in which we are in. The United Mine Workers was one of the first labor unions to support national climate change legislation. We endorsed the recommendations of the National Commission on Energy Policy in 2005. And we worked with Senators Bingaman and Specter in the design of their legislation in 2007, and that was supported by all the entire labor community, Edison Electric Institute, and so forth.

Since that time, we have been struggling with the details of cap and trade legislation and the specific impact that specific legislation would have on coal miners. It usually comes down for us to a fundamental question of how much and how soon relative to the availability of the technology. And it is unlike the acid rain debate, where my colleague David Hawkins and I fought for years——

Mr. HAWKINS. In a friendly way.

Mr. TRISKO. In a friendly way, in a mutual effort to encourage the use of scrubber technologies by power plants, because my workers recognized that that was the way to retain employment in eastern coal fields. We got a little bit in the form of some bonus allowances in the 1990 amendments, but we didn't get nearly enough to protect our interests.

Senator BOXER. So let me sum it up because I have run out of time for sure. What you are saying is you supported the Bingaman-Specter bill, and you are looking to make this bill look more like that. Is that a good sum up?

Mr. TRISKO. I think that is a good summary.

Senator BOXER. Is that a fair way to sum it up?

Mr. TRISKO. Madam Chair, and we are also trying, as we emphasized in our preliminary discussions with committee staff, we have always sought to play a constructive role in this debate.

Senator BOXER. You have.

Mr. TRISKO. And one of the issues that we are pursuing, and as far as we know are one of the few groups doing it, is there is a lot of concern about the availability of international offsets. There was testimony last month to the effect that the CDM program before the United Nations has been in effect for 7 years. It has generated only 300 million tons of CO_2 offsets throughout the life of the program. And yet this bill is so critically dependent upon the availability of both domestic and international offsets in terms of moderating the economic impacts of the bill.

If you have all the offsets that you promised to deliver, the reduction of industrial shipments, and I am citing EIA's analysis of the House bill, the reduction of industrial shipments is about 2 percent in the year 2030. I think that is a number that a lot of people could live with. But if the offsets aren't there, if they are not available in the quantities promised——

Senator BOXER. Right. Well, that is why we increased the numbers of domestic offsets. But my time is over.

Mr. TRISKO. OK.

Senator BOXER. We will work with you. We will continue to work with you. We appreciate your being here.

Senator Inhofe, we will give you an added couple of minutes on to your time.

Senator INHOFE. Well, thank you very much, Madam Chairman.

Mr. Cicio, for a minute let's leave these euphoric utopian visions and get down to reality. If you are really concerned about unilateral action, stopping and realizing that your manufacturers we are talking about that you visited are going to have to go someplace for energy. If the third world countries, if China and India and Mexico and other places are not going to join in this thing, then they are going to have the access to the energy. And I quote now, I could quote, if there were time, from all these countries, but India's Environmental Minister said, "India will not accept any emission reduction targets, period." This is a non-negotiable stand. So I assume they are not going to do it.

Now, you combine that statement with the very honest response that the Director of the EPA, Lisa Jackson, said, and that is that if we unilaterally do something in this country, it will not have a reduction in CO_2 emissions.

So kind of explain to me, you know, what your feeling is about that. It goes back to something we seem to have forgotten about. It is called supply and demand. Where are we going to get our energy?

Mr. CICIO. Thank you, Senator. Manufacturers are a unique sector of the economy, and each CEO of these companies have, most of them have a global perspective, and they have a responsibility to their shareholders to protect shareholder value. And for companies who use a lot of energy to make their products, they have to go where the energy is affordable on a relative basis.

I make this point because it is important. If energy went up in price around the globe to deal with climate change, we would not be damaged. But if energy cost goes up in the United States and does not go up in places where we compete—China and India, all these other places——

Senator INHOFE. To be competitive, they have to go where the energy is competitive.

Mr. CICIO. They will move. And they have moved and unfortunately they are going to continue to move. And the promise of higher prices is greatly concerning to their competitiveness.

Senator INHOFE. I appreciate that, Mr. Cicio.

And Mr. Smorch, when you were talking about small refineries, we in my State of Oklahoma, we have the Wynnewood Refinery, the Ponca City Refinery. We have small refiners throughout our State, and the Chairman made some statements about all of the relief that is there for small refineries. I read the language and I think it may have the effect of delaying your execution, but what is your feeling about what is going to happen, insofar as after you have heard the expressions from the Chairman, of the small refineries?

I am very concerned about this because that is a major thing in my State of Oklahoma.

Mr. SMORCH. Well, from CountryMark's perspective, as I talked about, even after looking at no cost allowances that are even proposed in the current legislation, we look at our costs will exceed over $100 million per year. And when you compare that to our average annual income of only $35 million a year, we don't see how that adds up. So from CountryMark's perspective, I don't believe that it goes far enough at this time.

Now, as far as small business refiners and small refiners as a group, I am not the spokesman for all small refiners.

Senator INHOFE. Yes, but you are the closest thing on this panel.

Mr. SMORCH. That is true. And I can't talk for everybody because everybody is different configurations and everything like that, but in my opinion, I think most small refiners are in the same boat that CountryMark is in, and it is going to be a huge cost that we just do not have the money for.

Senator INHOFE. Yes.

And Mr. Hawkins, we have been getting a lot of mixed feelings in discussions and references to coal. NRDC, on your Web site you have defined coal: coal is dirty; coal is dangerous; coal is the single greatest threat to civilization and all life on our planet.

Do you agree with these statements?

Mr. HAWKINS. I think that all of those statements are referring to the way coal is used today. We have many statements on our Web site, and in my testimony before this committee on numerous occasions and in the work we have been doing on this bill and the House bill, supporting a pathway for coal so that it doesn't continue to be used the way it is today. That is why we support the billions of dollars in allowances for carbon capture and storage deployment.

So NRDC's position on coal is not to be against coal. It is to be against the abuse of the way coal is used today.

Senator INHOFE. Do you think the way they are doing it now in the new plants, the new coal fired generating plants in China is something that is acceptable and that you would encourage in the United States?

Mr. HAWKINS. The first thing to do with a coal plant, of course, is to improve its efficiency, and China is building more efficient plants, and any coal plants built in the United States should be efficient as well. But we believe that any coal plants built in the United States should deploy carbon capture and storage.

Senator INHOFE. Which China does not.

Mr. HAWKINS. That is right. And we are working in China to persuade them that this is a sensible thing to do, and every time we talk to them about it, they say, what is the United States doing?

So I hope to be able to come back with a stronger argument the next time I visit.

Senator INHOFE. Mr. Trisko, do you think that coal is dirty and dangerous and is the single greatest threat to civilization and all life on our planet?

Mr. TRISKO. No, Senator, I disagree with that statement. I think that coal has historically provided tremendous benefits to our society and to our industrial economy. Coal is a 2 cent energy commodity, basically, and what we are talking about in terms of a transition to a cleaner renewable energy economy is an 8 cent or a 10 cent form of energy.

So when you make a transition from a 2 cent per kilowatt hour fuel to an 8 or a 10 cent, that transition is going to have some costs associated with it.

But that being said, we know well, and EPA's reports document clearly, that the utility sector has achieved a very solid record of progress in reducing its emissions of criteria pollutants like SO_2 and NO_x over the years and will continue to do so under the Clean Air Act.

Senator INHOFE. Well, I hope you will take back to some of your people my experience in an area I was privileged to go to in Ohio, right on the West Virginia border, and meeting with a lot of the coal people and the terminology they used as to, we are talking about fourth and fifth generation people who have lived their lives for coal. And here we are dependent upon coal for 53 percent of our ability to run this machine called America. You can tell them there are several of us up here who want to help them.

Mr. TRISKO. Thank you, Senator.

Senator BOXER. And the bill is very much dedicated to clean coal. Most of this bill is dedicated to clean coal.

Senator Merkley.

Senator MERKLEY. Thank you very much, Madam Chair.

And I am going to mispronounce your name, but Mr. Dolezalek, it sounds from your testimony that from an economic and business perspective, you could do more than a 20 percent reduction in 2020. A greater education could mean a greater investment in clean energy technologies, creating more jobs. Is that the way you frame it, or do you think from a business perspective the 20 percent target is something we can achieve?

Mr. DOLEZALEK. Our experience has been that on a lot of these things, we underestimate what people as individuals can do. Obviously, as a venture fund, we tend to invest in individual entrepreneurs and small businesses. Much of what we hear in these committee meetings, whether it goes all the way back to the problem about Y2K, about the switch to unleaded gasoline, about the switch to digital television, tends to focus on how difficult it is for corporations, for large organizations to make those moves.

Our experience has been that when we look at those same things after the fact, we actually make far more progress because we unleash the innovation, the dedication, the creativity of the American public. We think we will do the same thing here. But at the same time, obviously, there is a difficult balancing of interest. And I think what this bill has done a very, very good job with is to recognize that change is a hard thing to do.

We are fairly comfortable that we will actually do far better than these targets. But at the same time, there are those who need to be convinced of that, and the balancing of those interests is a delicate process.

Senator MERKLEY. If indeed through, we had testimony earlier about just energy efficiency could close the gap between where we are now, which is closing in on 9 percent below 2005 and the target of 20 percent below 2005, so that is basically a 1 percent reduction per year over the next 11 years.

We had testimony earlier that just energy efficiency could close that gap. If indeed energy efficiency is pursued aggressively, does that imply then that that is really going to keep a downward pressure on the cost of the allocations?

Mr. DOLEZALEK. I think it will. The reality, again, is that a lot of these technologies have moved far further than even we thought. We have seen, for example, that the pricing of LED lighting has dropped precipitously just in the last year. That obviously has a huge impact. Lighting is roughly 22 percent of the building energy use. If you can suddenly take a big chunk of that cost out and save the energy, it has very, very immediate impacts.

So what I think, again, we tend to focus on wind. We focus on solar. We focus on sort of the bigger measures. What I think we are going to continue to see is the surprises in this. We have seen it in electric automobiles which went from impossible to suddenly every major manufacturer in the world is announcing their electric automobiles. Those surprises will do a lot to keep these prices down.

Senator MERKLEY. One of the efficiency issues that I am very conscious of because I go around before my house before I go to bed is all the vampire electronics, the copier, my son's video game operation, the computers that are sitting on that look like they are turned off, but they are not.

And I believe that I read that Europe has been much more aggressive about how they structure consumer electronics in terms of this vampire issue. And I was wondering if you or other members of the panel could comment on that and how we might be more aggressive on that here in America?

Mr. DOLEZALEK. What is interesting is our telecommunications industry is doing an awful lot in terms of transitioning to address just this. And surprisingly, it is doing it even before sort of regulation forces it to happen because what we are seeing is the same devices that you use to create wireless connectivity in your house can start measuring what your refrigerator does, measuring when you are home, when you are not home, and start controlling automatically the power load in the house to be appropriate to your presence. Those technologies, again, are moving much, much more rapidly because they rely on what we have done for the last 30 years and they are simply reapplying them to the grid from where they were applied in the telecom field.

Senator MERKLEY. I have 10 seconds left. Would you like to comment on that, Mr. Hawkins?

Mr. HAWKINS. Yes. The opportunity to save energy consumption in these appliances and other ubiquitous things like the soda vending machines is enormous. And we at NRDC have been working with the designers of these technologies, and there is a long list of ideas to improve their performance. And if they cost a few pennies more for the initial cost, there is a barrier however. And we can overcome that barrier with smart policy that rewards efficiency.

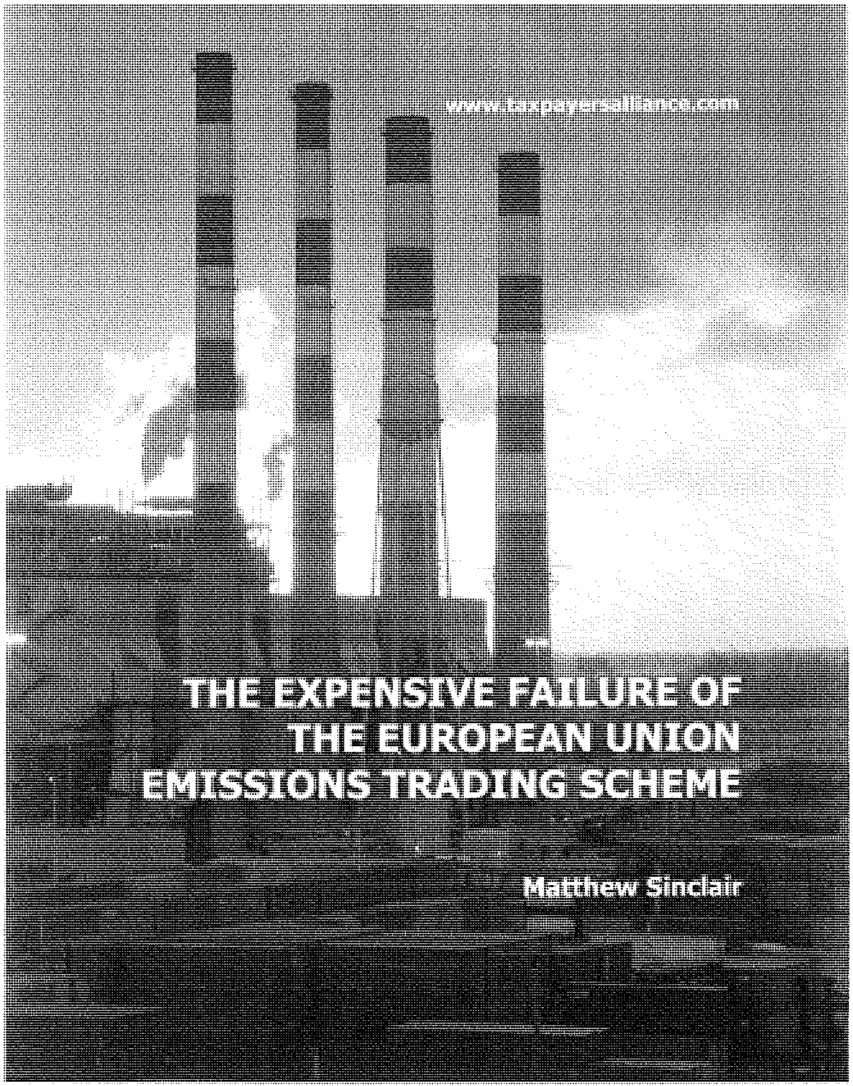
Senator MERKLEY. Thank you very much.

Thank you, Mr. Chair.

Senator INHOFE. And before going to Senator Voinovich, I have a couple of documents I am going to ask for unanimous consent to be a part of the record. One is the study from the TaxPayers' Alliance. It comes to the conclusion that of how much the British consumers are having to spend, some $3 billion in 2008, as a result of their efforts, along with several letters. I would like to submit those for the record.

Hearing no objection, so ordered.

[The referenced information follows:]



www.taxpayersalliance.com

THE EXPENSIVE FAILURE OF THE EUROPEAN UNION EMISSIONS TRADING SCHEME

Matthew Sinclair

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About the author

Matthew Sinclair is the Research Director at the TaxPayers' Alliance. Since joining the TPA in May 2007, he has produced major reports on government capital procurement, environmental policy, NHS performance, the dynamic effects of corporate tax cuts, the economic and social burden of crime and the effects of aid policy, among others. He frequently represents the TaxPayers' Alliance on the television and radio, particularly on economic matters.

Executive Summary

This report presents new evidence that the European Union Emissions Trading Scheme (ETS) has failed to perform and is imposing serious costs on ordinary families.

The burden on consumers since the scheme was introduced at the beginning January 2005 has been significant:

- We estimate that the ETS **cost British consumers nearly £3 billion in 2008**, equivalent to **around £117 per family.**
- From its introduction to the end of 2008, we estimate that the scheme has cost **consumers across Europe between €46 billion and €116 billion**. Our **central estimate** is that the scheme has **cost consumers €93 billion**. That is equivalent to around **€185 for every person in the ETS participating countries**. That is despite the emissions price having collapsed several times for prolonged periods.
- The report also presents estimates of the cost to consumers in every country participating in the scheme, in each year of the scheme's operation.

The British Government has not just accepted this significant burden on consumers, but has assisted the European Commission in legal disputes, at the European Court of Justice, with other member states in an attempt to reduce their allocations and thereby increase the emissions price. The Treasury Solicitor's Office, responding to a TaxPayers' Alliance Freedom of Information request, has revealed the amount spent on two recent cases, both of which the Commission and the British Government lost:

- The cost of the Government's intervention in T-183/07 **Poland v Commission** was **£30,698.10.**
- The cost of the Government's intervention in T-263/07 **Estonia v Commission** was **£12,201.59.**

The report also looks at other problems with the design and operation of the scheme:

- The emissions price has been very volatile, collapsing by a third or more several times since the ETS was introduced. That makes it harder for businesses and families to plan and forces them to provide for more frequent swings in their energy costs; the financial cost of the scheme to consumers is compounded by its high volatility. That high volatility also undermines the effectiveness of the scheme. Volatility in the price is likely to prove an enduring feature of the ETS carbon market.
- As the ETS pushes up electricity prices, it imposes the greatest burden on the poor and elderly, who spend the highest proportion of their income on electricity. And, on manufacturing industries where energy costs are a substantial portion of their total production costs. Energy firms make substantial windfall profits, even in competitive

energy markets. Even when permits are auctioned, the scheme is still a highly regressive tax.

- The design of the scheme means that it doesn't balance the costs and benefits of cutting emissions, and can impose a massively disproportionate burden on consumers if the cost of cutting emissions is found to be higher than those managing the scheme expect. The price is already higher than many social cost estimates from prominent academics like William Nordhaus and surveys of the academic literature.

The Emissions Trading scheme isn't performing and is costing ordinary families and manufacturing industries a fortune. It should be abolished.

1. Introduction

The European Union Emissions Trading Scheme (ETS) was introduced in January 2005 as the centre piece of the European Union's policy response to the threat of climate change. It is the largest cap and trade scheme in the world, covering over 11,500 installations across all of the member states and Norway.

The theory behind the scheme is simple: a limit is placed on the amount of carbon dioxide that can be emitted in total and firms are then allowed to trade the right to emit, which produces an effective price on emissions and should mean that reductions take place where it is most affordable to do so.

In practice, things have been far more complex. There have been disputes, some reaching the European Court of Justice, over the National Application Plans drawn up by the different countries, which have to set out the right level of emissions for the thousands of installations covered by the scheme. The emissions price has been so volatile that energy companies and environmentalists have called for intervention to put in place a minimum price. There has been concern that energy companies have reaped billions in windfall profits. Most importantly, the scheme appears to have imposed a substantial bill on consumers and manufacturing industries.

Despite all this, European Union officials and many participating governments continue to hold the scheme up as a success and see their main task as expanding its scope and ambition. Jos Delbeke, the Deputy Director General of the Environment Directorate-General in the European Commission, recently told an audience in Berlin: "We are on the right path. We should embrace the opportunity offered by emissions trading- to go global and to reduce emissions worldwide."[1]

With the ETS well into its second phase, and other countries considering similar policies, it is the right time to try and assess whether it can function effectively and what price consumers have paid.

Section 2 of this report looks at the volatility of the emissions trading market and why the volatility is likely to prove an inherent feature of the ETS, however it is constituted. It then sets out how the design of the scheme means that the burden imposed on consumers can quickly become disproportionate, as the scheme doesn't balance the costs of reducing emissions against other priorities.

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[1] Delbeke, J. *'Environmental policy in times of economic crisis – the example of the EU ETS',* Speech in Berlin on accepting the Adam Smith Prize 2009, http://ec.europa.eu/environment/climat/emission/pdf/speech_berlin_290509.pdf, 29 May 2009

Section 3 examines why the ETS has produced substantial windfall profits for industry and burdens the poorest.

Section 4 presents new evidence suggesting that the scheme has already created significant costs for ordinary people.

Section 5 outlines the amount that the British Government spent supporting the European Commission in cases against Poland and Estonia where, if the Commission had won, it would have increased the burden on consumers.

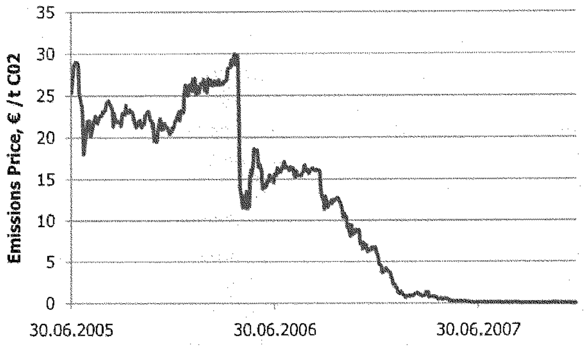
Finally **Section 6** concludes the report and argues that the scheme should be abolished.

2. Volatility

The emissions price has rapidly fallen by a third or more a number of times since the ETS was put in place in 2005:

- In 2005, the price fell from €29 per tonne on 11 July to €18 per tonne on 22 July. It then slowly recovered to just under €30 again by 24 April 2006 before collapsing again to just over €14 by 28 April. It then slowly declined effectively to zero for the rest of Phase I, falling below €1 per tonne in February 2007 and then continuing to decline.[2] This complete collapse in the price has been attributed to many of the participating countries allocating an excessive number of allowances, with the United Kingdom a notable exception.[3]

Figure 1: Emissions price, € /t CO_2, June 2006 to November 2007



- In 2008 the price fell from around €28 per tonne in July to around €15 in December. It declined further to just over €8 per tonne in February 2009. It has since recovered somewhat to a range between €13 and €15 per tonne.[4] This two thirds fall in the price, and stabilisation at half the original price, is generally attributed to the fall in economic activity in the recent recession reducing demand for emissions allowances.

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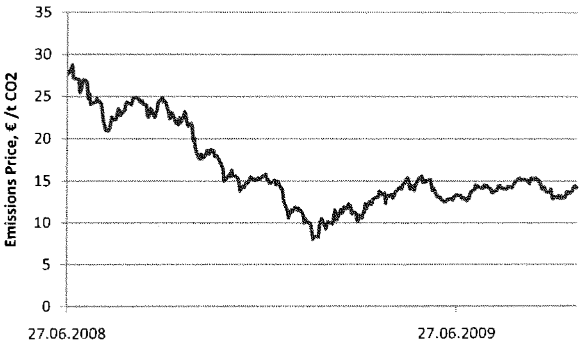
[2] EEX Market Data
[3] Open Europe *'The high price of hot air: Why the EU Emissions Trading Scheme is an environmental and economic failure'*, 2 July 2006
[4] EEX Market Data

Figure 2: Emissions price, € /t CO_2, June 2008 to October 2009



This substantial volatility in the emissions price has important consequences:

- It makes it harder for firms and families to effectively manage their affairs as it makes their costs less predictable. Providing for more pronounced and frequent swings in their energy bills can clearly be expensive, particularly for those companies and households where energy is a large part of their total costs. That has to be understood as a significant, though difficult to quantify, additional cost of the ETS to consumers. The burden of the scheme is compounded by its unpredictability.
- It weakens the incentive produced by the carbon price to make investments that reduce emissions. A central objective of the ETS is to encourage investment in reducing carbon dioxide emissions. As Oliver Tickell, a prominent environmentalist, has said: "Wild fluctuations create a risk that deters some investors altogether and makes others demand a significant risk premium, putting up the price of capital."[5] EDF Energy have called for a floor on the carbon price to "encourage investment in low-carbon energy like nuclear power".[6]

Fixing the price would call into question the entire point of the trading scheme. The authorities responsible for the scheme believe that a clearer, central cap declining at 1.74 per cent each year will offer a more solid basis for the market and reduce volatility.[7] However, such hopes are likely to be disappointed. The following identity, which gives a simple picture of the key factors driving demand for allowances, helps to explain why:

Emissions = GDP x Emissions Intensity

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[5] Tickell, O. 'Carbon: a market we can't allow to fail', *Guardian*, 29 January 2009

[6] Reuters *'EDF Energy calls for UK carbon floor price'*, 26 May 2009

[7] Delbeke, J. *'Environmental policy in times of economic crisis – the example of the EU ETS'*, Speech in Berlin on accepting the Adam Smith Prize 2009, http://ec.europa.eu/environment/climat/emission/pdf/speech_berlin_290509.pdf, 29 May 2009

While it can be possible for governments, companies and individuals to plan steady improvements in their carbon efficiency – and reduce their emissions intensity, demand for emissions allowances will also be driven by economic growth or recession. This can be seen in the recent steep fall in the price as a result of global economic downturn.

Changes in demand for emissions allowances are therefore unpredictable and have dramatic effects on the emissions price as supply is fixed. This is similar to the situation in the British housing market, where planning regulations limit supply meaning that demand is reflected almost entirely in the price. With a fixed supply of allowances, increases or decreases in demand are entirely reflected in the price. That is why other emissions trading schemes have seen similar volatility[8] and the effectiveness of the ETS is likely to continue to be undermined by a failure to produce a stable price.

While volatility in the price has so far taken the form of collapses, there is no reason to think that similar volatility cannot take the form of a sharp rise in prices:

- Just as the recession has seen the price collapse, unexpected rises in economic growth could increase demand for allowances and lead to rapid rises in the price.
- It may not be possible to improve carbon efficiency at the rate envisioned by those setting the ETS cap on emissions. Again, once that was appreciated it could lead to rapid rises in the price.

This is critical because the scheme can easily impose costs disproportionate to its objectives:

- Prominent academics have produced a range of estimates of the social cost of carbon dioxide emissions, the cost imposed on society now and in the future by the choice to emit. William Nordhaus, sometimes referred to as the "father of climate change economics", produced an estimate of $7.40 per tonne of CO_2.[9] Richard Tol has produced a survey of 211 estimates which suggests a social cost of carbon of $6.82 per tonne of CO_2 (converted from $25 per tonne of carbon at a rate of 100:25.29) and that newer estimates tended to suggest lower values.[10] The cost is projected to rise over time, but the current price under the ETS, of around €14 per tonne, is already higher than those social cost estimates and expected to rise significantly. That suggests the ETS may impose a burden disproportionate to its objectives even without being combined with other policies in this area like renewable energy subsidies and mandates.
- There is clearly uncertainty over both how large the damages from global warming will be and over how expensive it will be to avoid them. The cap and trade approach

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[8] Green, K. P., Hayward, H. F. & Hassett, K. A. 'Climate Change: Caps vs. Taxes', *American Enterprise Institute*, June 2007

[9] Nordhaus, W. *'The Challenge of Global Warming: Economic Models and Environmental Policy'*, 24 July 2007

[10] Tol, R. S. J. 'The Social Cost of Carbon: Trends, Outliers and Catastrophes', *Economics Discussion Papers*, 2007

of the ETS does not strike a balance between the costs and benefits of reducing emissions. It could force families and firms to pay an excessive price to make cuts in emissions that could not be justified in a cost-benefit analysis, if the cost of reducing emissions is higher than those setting the target expect.

The high volatility of the carbon price doesn't just undermine its success. It threatens to impose huge and disproportionate costs on ordinary people and industry if cutting emissions turns out to be harder than those running the scheme expect.

3. Windfall profits and regressive taxation

Energy companies make windfall profits under the ETS. These windfall profits have been misunderstood as the product of firms abusing market power in some way, in fact the windfall profits are likely to be greatest in a competitive market. This point is quite counterintuitive but accepted within the academic literature on the ETS:

- Allowances are given to the firms for free but they are scarce and have a value, as can be seen from the price in the carbon market.
- That means that, whether firms are buying the allowances in the market or using those they have been freely allocated, the need to hold them pushes up the cost of production relative to not producing and selling the allowance or not buying it in the first place.
- Increasing the opportunity costs of production increases the price those firms charge consumers. All firms need to hold emissions allowances and, therefore, face the same costs and cannot undercut their rivals.

Another description of the process is provided in a Ruhr Economic Paper by Manuel Frondel, Christoph M. Schmidt and Colin Vance:[11]

> *"Electricity markets follow the same economic laws as other markets, but with some important particularities. Two key properties of electricity are that, first, it cannot be stored at low cost in large quantities and, second, its demand is highly price-inelastic in the short term, but subject to substantial temporal fluctuations. These properties imply a high degree of volatility of electricity prices. In the public debate, these substantial fluctuations are frequently misinterpreted as a sign of lacking competition among electricity producers. In a similar vein, public skepticism was also aroused by the ETS-induced increase in electricity prices following the largely cost-free allocation of CO2 emission allowances.*
>
> *Both phenomena, however, cannot be taken as indicators for the presence of market power. Rather, the electricity-price-raising impact of certificates would also arise under perfect and imperfect competition alike. Regardless of whether certificates are distributed at no cost or have to be purchased, they have a value that can be observed on a daily basis at exchanges such as the Leipzig Power Exchange. Because of the possibility to sell certificates and obtain a profit, a rational electricity supplier will only produce a megawatt hour (MWh) of electricity if the profit from electricity generation is at least as high as the revenue that would be garnered from selling the otherwise*

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[11] Frondel, M., Schmidt, C. M. & Vance, C. 'Emissions Trading: Impact on Electricity Prices and Energy-Intensive Industries', *Ruhr Economic Papers*, #81, December 2008

required certificates at the market. The electricity price that a rational supplier therefore demands should cover production- and opportunity costs, where in this case the opportunity cost originates from the certificates' value. It bears noting that taking account of opportunity cost is not specific for the analysis of electricity prices. Rather, the concept of opportunity costs is deeply rooted in economic reasoning, and is applicable in many contexts.

Although opportunity costs are not incurred in the same sense as the actual costs associated with inputs to electricity production, such as natural gas, this kind of cost is nevertheless equally price-relevant: Irrespective of whether an emission allowance has been obtained via grandfathering or through an auction, the electricity producer always has the option of selling it at the exchange, rather than actually using it in the production process. That electricity prices need to reflect this option is independent of whether individual suppliers can exercise market power and of the allocation mechanism in place, be this grandfathering, auctioning, or some mixture of the two. Thus, the suggestions by politicians, consumers, and also cartel offices that electricity producers not include the value of grandfathered certificates in electricity prices is fundamentally at odds with free-market principles. Were the electricity sector forced to do so, rational electricity producers would certainly reduce production, thereby driving up electricity prices to the point that the sale of certificates would become the unattractive alternative relative to production. As a result, market laws ensure the inclusion of the certificates' value in the electricity price even in the presence of command and control measures."

As a result, much of the burden on consumers from the ETS is a transfer to energy companies. There are clear concerns about the scheme providing such a windfall to the firms. Increasingly, permits are going to be auctioned, but substantial windfall profits will continue at least until 2021.

The increase in electricity prices also does not affect everyone equally:

- As figure 3 shows, those on lower incomes tend to spend a higher proportion of their income on electricity.[12]

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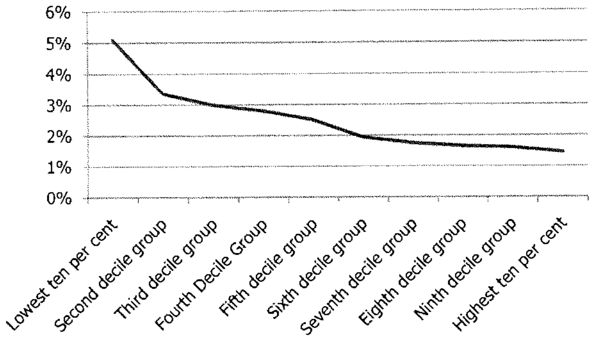
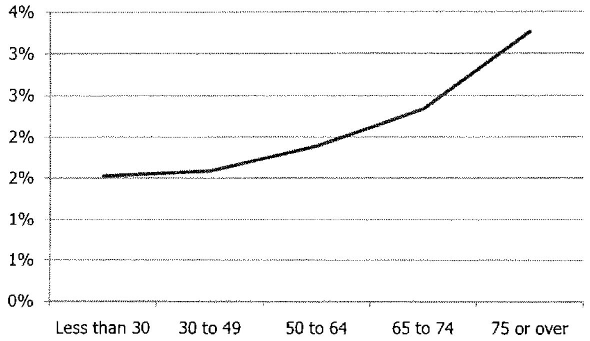
[12] Office for National Statistics, *Annual Survey of Hours and Earnings 2008* and *Family Spending 2008*

Figure 3: Spending on electricity as a percentage of gross income, by income decile



- As figure 4 shows, older people tend to spend more on electricity, as a proportion of their total expenditure, as well.[13]

Figure 4: Spending on electricity as a percentage of total expenditure, by age group



Needless to say, a transfer from the poor and elderly to energy companies is one that policymakers would normally avoid. Plans to move towards auctioning will make the scheme operate more along the lines of a tax, as the revenue would go to government, but it would be a very regressive tax imposing the greatest burden on the worst off and most vulnerable.

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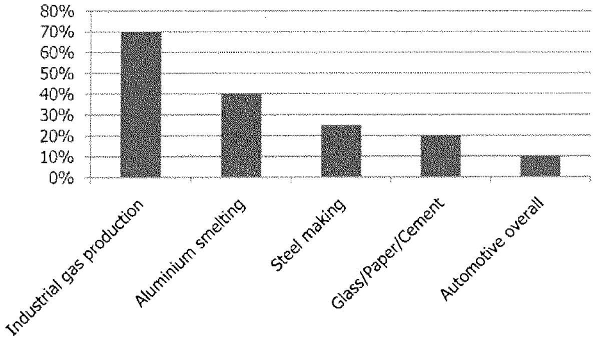
[13] Office for National Statistics, *Family Spending 2008*

Energy is also a substantial portion of the total production costs of many significant manufacturing industries, these rough figures are from industry sources:

Figure 5: Energy as a percentage of total production costs, by industry



Increasing costs to manufacturing firms has serious negative effects:

- Industry will struggle to compete, with jobs and income going to countries without such a burden on their manufacturing firms.
- If manufacturing capacity is moved abroad then emissions will not be cut at the global level.

While governments may attempt to help manufacturing industries threatened by these policies, such an increase in dependency on government assistance is likely to make the industry and the wider economy less competitive over time.

4. The cost to consumers

As explained in **Section 3**, in a perfectly competitive market the entire carbon price would be passed on to consumers. It is widely expected though, that for a number of reasons such a result in unlikely and a fraction of the carbon price will be passed through to consumers:

- Prices may be regulated, particularly in the electricity market.
- Companies may decide to restrain price rises in order to promote their political interests. In particular, electricity companies may be aware that perceived windfall profits will hasten moves to auction allowances and thereby significantly increase their costs.
- Uncertainty over the price of emissions and the actions of other energy companies may cause firms to restrain price increases, in order to avoid any risk of losing market share.

While it is not possible to use this expression in practice, the cost of the ETS to consumers can theoretically be summarised as follows:

$$\sum_{e=1}^{n} E(p_e)\beta_e$$

Where,

p = Price;
β = Pass-through rate;
e = Tonne of carbon dioxide emitted, and
n = Total number of tonnes of carbon dioxide emitted.

I.e. each tonne of carbon emitted will cost consumers the price the allowance might have expected to raise multiplied by the rate at which the carbon cost is passed-through to consumers in that particular instance.

That formula cannot practically be used to assess the cost to consumers of the ETS. There are two means by which it could be possible to estimate the effect of the ETS on prices:

1) Model the pattern of prices, based on variables such as fuel prices, before the implementation of the ETS then work out the difference between the modelled and actual prices, attributing the difference to the effects of the ETS.

2) Use annual data on average allowance prices and total ETS emissions from different countries combined with existing estimates of pass-through rates to produce a direct approximation of the cost to consumers

There are drawbacks to both approaches. The first approach is extremely vulnerable to omitted variable bias. If there were any other changes that occurred around the time of the introduction of the ETS that are not accounted for in the model, then it will produce extremely unreliable results. The second approach relies upon using existing estimates of the extent to which carbon costs are passed through that may not generalise well. For example, pass-through rates may increase or decrease over time and they are likely to vary significantly between countries.

For our report, we have taken the second approach. The risks of specifying the model incorrectly when using the first approach are extremely significant, particularly with an extremely complex and rapidly changing mixture of other interventions in the critical energy market. For example, Britain had an emissions trading scheme before the EU ETS, and its effect would need to be disentangled from the background pattern of energy prices, and most other countries have other major interventions in the market such as renewable energy subsidies.

The expression used in our research to calculate the total cost to consumers of the ETS between 2005 and 2008 is the following:

$$\beta \sum_{t=2005}^{2008} \left(\sum_{c} E_{ct} P_t \right)$$

Where,

E = Emissions;
P = Price;
β = Pass-through rate;
t = Year, and
c = Country.

This formula requires data on emissions, allowance prices and existing estimates of pass-through.

Emissions

The Community Independent Transaction Log records the issuance, transfer, cancellation, retirement and banking of allowances under the Emissions Trading Scheme. Annual data is released that provides the amount of carbon dioxide emitted from all of the around 10,500 installations across all of the 27 European Union member states and and Norway that take part in the ETS.[14] The data covers the period from 2005, when the scheme was started, through to 2008. Extracting the totals for each country, for each year, gives the totals show in Table 1.

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[14] The full tables are available from http://ec.europa.eu/environment/climat/emission/citl_en.htm

Table 1: Emissions by country, by year under the European Union Emissions Trading Scheme

Country	ETS Emissions, t CO$_2$				
	2005	2006	2007	2008	Total
AT	33,372,821	32,382,799	31,751,160	32,003,648	129,510,428
BE	55,363,198	54,775,289	52,795,293	55,463,954	218,397,734
BG	-	-	39,181,984	38,026,429	77,208,413
CY	5,078,877	5,259,273	5,396,164	-	15,734,314
CZ	82,454,615	83,624,950	87,834,755	80,075,385	333,989,705
DE	474,990,758	478,025,969	487,137,934	472,599,758	1,912,754,419
DK	26,475,717	34,199,587	29,407,354	26,545,260	116,627,918
EE	12,621,813	12,109,274	15,329,927	13,540,891	53,601,905
ES	183,626,970	179,724,855	186,573,429	163,454,804	713,380,058
FI	33,099,614	44,621,402	42,541,319	36,161,200	156,423,535
FR	131,263,785	126,979,046	126,634,804	123,442,083	508,319,718
GB	242,513,089	251,159,830	256,581,150	265,031,078	1,015,285,147
GR	71,267,735	69,965,144	72,717,005	69,853,893	283,803,777
HU	26,161,620	25,845,884	26,836,732	27,245,046	106,089,282
IE	22,440,996	21,705,324	21,246,113	20,381,698	85,774,131
IT	225,989,343	227,439,394	226,388,035	220,661,994	900,478,766
LI	-	-	-	19,883	19,883
LT	6,603,859	6,516,901	5,998,734	6,103,720	25,223,214
LU	2,603,349	2,712,972	2,567,231	2,098,895	9,982,447
LV	2,854,473	2,940,672	2,849,195	2,743,538	11,387,878
MT	1,971,258	1,985,765	2,027,364	-	5,984,387
NL	80,351,083	76,700,979	79,874,453	83,489,847	320,416,362
NO	-	-	-	19,342,240	19,342,240
PL	203,149,562	209,616,285	209,618,309	204,107,419	826,491,575
PT	36,425,912	33,083,868	31,229,218	29,914,270	130,653,268
RO	-	-	69,616,142	63,647,190	133,263,332
SE	19,381,609	19,888,862	19,040,519	20,007,104	78,318,094
SI	8,720,548	8,842,181	9,048,633	8,860,105	35,471,467
SK	25,231,753	25,543,225	24,516,816	25,488,101	100,779,895
Total	2,014,014,357	2,035,640,730	2,164,749,772	2,110,309,433	8,324,713,292

Prices

Data on the prices for allowances under the ETS is produced by European Energy Exchange AG (EEX). Their market data provides daily prices since the ETS was launched.[15] Unfortunately, there are not complete uninterrupted series for either of the two metrics presented: "Carbix EUR/EUA" or "Settlement Price EUR/EUA". The best measure is an average of the settlement prices weighted by daily volume, as that gives the best guide to the amount that someone selling an allowance could normally expect to get in return. Fortunately, the two metrics produce similar results. In 2006, for which uninterrupted series for both are available, the Carbix series had a linear average of 17.4 against a weighted average of 17.1 for the settlement prices.

As such, in those years, 2005 and 2008, in which the settlement price is interrupted we have combined the averages of the two series weighted by the number of days that they are used to account for.

The final average prices for each year are shown in Table 2.

Table 2: Average prices for emission allowances by year

	2005	2006	2007	2008
Price, € /EUA	20.40016	17.09592	1.49138	17.37918

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[15] The full tables are available from http://www.eex.com/en/Download/Market%20Data

Carbon costs

Multiplying the average prices by the emissions for each year gives an estimate of cost to consumers if 100 per cent of the of the carbon cost were passed on. Those estimates are shown in Table 3.

Table 3: Carbon cost by country, by year under the European Union Emissions Trading Scheme

Country	Carbon Cost, €				
	2005	2006	2007	2008	Total
AT	€680,810,958	€553,613,897	€47,353,051	€556,197,096	€1,837,975,002
BE	€1,129,418,214	€936,434,223	€78,737,853	€963,917,931	€3,108,508,221
BG	-	-	€58,435,234	€660,868,079	€719,303,313
CY	€103,609,914	€89,912,136	€8,047,732	-	€201,569,782
CZ	€1,682,087,513	€1,429,645,859	€130,995,012	€1,391,644,371	€4,634,372,755
DE	€9,689,888,463	€8,172,296,030	€726,507,857	€8,213,395,329	€26,802,087,679
DK	€540,108,919	€584,673,568	€43,857,545	€461,334,799	€1,629,974,831
EE	€257,487,031	€207,019,238	€22,862,749	€235,329,555	€722,698,574
ES	€3,746,019,955	€3,072,562,610	€278,251,913	€2,840,710,138	€9,937,544,617
FI	€ 675,237,491	€ 762,844,134	€ 63,445,280	€ 628,451,932	€2,129,978,838
FR	€2,677,802,493	€2,170,824,225	€188,860,636	€2,145,321,936	€7,182,809,290
GB	€4,947,306,329	€4,293,809,573	€382,660,040	€4,606,022,287	€14,229,798,229
GR	€1,453,873,347	€1,196,118,842	€108,448,700	€1,214,003,242	€3,972,444,131
HU	€533,701,289	€441,859,290	€40,023,770	€473,496,505	€1,489,080,854
IE	€457,799,956	€371,072,587	€31,686,032	€354,217,158	€1,214,775,733
IT	€4,610,219,232	€3,888,286,782	€337,630,627	€3,834,924,077	€12,671,060,718
LI	-	-	-	€345,550	€345,550
LT	€134,719,794	€111,412,450	€8,946,393	€106,077,637	€361,156,273
LU	€53,108,742	€46,380,765	€3,828,717	€36,477,070	€139,795,294
LV	€58,231,712	€50,273,507	€4,249,233	€47,680,435	€160,434,888
MT	€40,213,983	€33,948,489	€3,023,570	-	€77,186,042
NL	€1,639,175,119	€1,311,274,171	€119,123,176	€1,450,984,914	€4,520,557,380
NO	-	-	-	€336,152,232	€336,152,232
PL	€4,144,283,997	€3,583,584,250	€312,620,590	€3,547,219,171	€11,587,708,009
PT	€743,094,510	€565,599,320	€46,574,637	€519,885,424	€1,875,153,890
RO	-	-	€103,824,134	€1,106,135,846	€1,209,959,980
SE	€395,387,966	€340,018,490	€28,396,656	€347,707,022	€1,111,510,130
SI	€177,900,593	€151,165,262	€13,494,952	€153,981,342	€496,542,149
SK	€514,731,851	€436,685,054	€36,563,893	€442,962,245	€1,430,943,044
Total	€41,086,219,371	€34,801,314,753	€3,228,449,979	€36,675,443,326	€115,791,427,428

Pass-through

There have been a number of estimates of the extent to which carbon costs can be expected to be passed through to consumers. Estimates for Germany and the Netherlands found pass-through rates varying between 60 and 100 per cent in the power sector.[16] On the basis of this estimate, other researchers have taken a mid-range of 80 per cent.[17] It should be noted though, that the experience of Germany and the Netherlands may not reflect that of other countries taking part in the Scheme. In particular, countries like France and Italy are likely to see lower pass-through rates thanks to extensive price regulation while Britain, with its particularly liberalised energy markets, is likely to see a particularly high degree of pass-through.

In this paper, we will therefore produce estimates of the cost to consumers on the basis of a 40 per cent and 80 per cent pass-through as well as the 100 per cent pass-through figures given above. This yields the results in Tables 4 and 5.

Table 4: Cost to consumers by country, by year under the European Union Emissions Trading Scheme with a 40 per cent pass-through rate

Country	Cost to consumers at 40% pass-through, €				
	2005	2006	2007	2008	Total
AT	€272,324,383	€221,445,559	€18,941,220	€222,478,838	€735,190,001
BE	€451,767,286	€374,573,689	€31,495,141	€385,567,172	€1,243,403,288
BG	-	-	€23,374,094	€264,347,232	€287,721,325
CY	€41,443,966	€35,964,854	€3,219,093	-	€80,627,913
CZ	€ 672,835,005	€ 571,858,343	€ 52,398,005	€556,657,749	€1,853,749,102
DE	€3,875,955,385	€3,268,918,412	€290,603,143	€3,285,358,132	€10,720,835,072
DK	€ 216,043,567	€233,869,427	€17,543,018	€184,533,920	€651,989,932
EE	€102,994,813	€82,807,695	€9,145,100	€94,131,822	€289,079,430
ES	€1,498,407,982	€1,229,025,044	€111,300,765	€1,136,284,055	€3,975,017,847
FI	€270,094,997	€305,137,654	€25,378,112	€251,380,773	€851,991,535
FR	€1,071,120,997	€868,329,690	€75,544,254	€ 858,128,775	€2,873,123,716
GB	€1,978,922,532	€1,717,523,829	€153,064,016	€1,842,408,915	€5,691,919,291
GR	€581,549,339	€478,447,537	€43,379,480	€485,601,297	€1,588,977,652
HU	€213,480,516	€176,743,716	€16,009,508	€189,398,602	€595,632,341
IE	€183,119,983	€148,429,035	€12,674,413	€141,686,863	€485,910,293
IT	€1,844,087,693	€1,555,314,713	€135,052,251	€1,533,969,631	€5,068,424,287
LI	-	-	-	€138,220	€138,220

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[16] Sijm, J., Neuhoff, K. & Chen, Y. 'CO2 cost pass-through and windfall profits in the power sector', *Climate Policy*, 6, 49-72, 2006

[17] Frondel, M., Schmidt, C. M. & Vance, C. 'Emissions Trading: Impact on Electricity Prices and Energy-Intensive Industries', *Ruhr Economic Papers*, #81, December 2008

Country	Cost to consumers at 40% pass-through, €				
	2005	2006	2007	2008	Total
LT	€53,887,918	€ 44,564,980	€3,578,557	€42,431,055	€144,462,509
LU	€21,243,497	€18,552,306	€1,531,487	€14,590,828	€55,918,118
LV	€23,292,684.77	€20,109,402.98	€1,699,693.17	€19,072,174.13	€64,173,955
MT	€16,085,593	€13,579,396	€1,209,428	-	€ 30,874,417
NL	€ 655,670,048	€524,509,668	€47,649,270	€580,393,966	€1,808,222,952
NO	-	-	-	€ 134,460,893	€134,460,893
PL	€1,657,713,599	€1,433,433,700	€125,048,236	€1,418,887,668	€4,635,083,203
PT	€ 297,237,804	€ 226,239,728	€18,629,855	€207,954,170	€750,061,556
RO	-	-	€ 41,529,654	€ 442,454,338	€ 483,983,992
SE	€158,155,186	€136,007,396	€11,358,661	€139,082,809	€444,604,052
SI	€71,160,237	€60,466,105	€5,397,981	€61,592,537	€198,616,859
SK	€ 205,892,741	€ 174,674,022	€14,625,557	€177,184,898	€572,377,218
Total	€16,434,487,748	€13,920,525,901	€1,291,379,991	€14,670,177,330	€46,316,570,971

Table 5: Cost to consumers by country, by year under the European Union Emissions Trading Scheme with an 80 per cent pass-through rate

Country	Cost to consumers at 80% pass-through, €				
	2005	2006	2007	2008	Total
AT	€544,648,767	€442,891,118	€37,882,440	€444,957,677	€1,470,380,002
BE	€903,534,571	€749,147,378	€62,990,283	€771,134,344	€2,486,806,577
BG	-	-	€46,748,187	€528,694,463	€ 575,442,651
CY	€ 82,887,931	€ 71,929,709	€6,438,186	-	€ 161,255,826
CZ	€1,345,670,010	€1,143,716,687	€104,796,010	€1,113,315,497	€3,707,498,204
DE	€7,751,910,770	€6,537,836,824	€581,206,286	€6,570,716,263	€21,441,670,143
DK	€432,087,135	€467,738,855	€35,086,036	€369,067,839	€1,303,979,865
EE	€205,989,625	€165,615,390	€18,290,199	€188,263,644	€578,158,859
ES	€2,996,815,964	€2,458,050,088	€222,601,530	€2,272,568,110	€7,950,035,693
FI	€540,189,993	€610,275,307	€50,756,224	€502,761,546	€1,703,983,070
FR	€2,142,241,994	€1,736,659,380	€151,088,509	€1,716,257,549	€5,746,247,432
GB	€3,957,845,063	€3,435,047,658	€306,128,032	€3,684,817,830	€11,383,838,583
GR	€1,163,098,678	€ 956,895,074	€ 86,758,960	€ 971,202,594	€3,177,955,305
HU	€ 426,961,031	€ 353,487,432	€ 32,019,016	€ 378,797,204	€1,191,264,683
IE	€ 366,239,965	€ 296,858,070	€ 25,348,825	€ 283,373,726	€ 971,820,587
IT	€3,688,175,386	€3,110,629,426	€270,104,502	€3,067,939,262	€10,136,848,575
LI	-	-	-	€ 276,440	€ 276,440
LT	€107,775,835	€89,129,960	€7,157,114	€84,862,109	€288,925,019
LU	€42,486,993	€37,104,612	€3,062,974	€29,181,656	€111,836,235

Country	Cost to consumers at 80% pass-through, €				
	2005	2006	2007	2008	Total
LV	€46,585,370	€ 40,218,836	€ 3,399,386	€ 38,144,348	€ 128,347,910
MT	€32,171,186	€27,158,791	€2,418,856	-	€61,748,834
NL	€1,311,340,095	€1,049,019,337	€ 95,298,541	€1,160,787,931	€3,616,445,904
NO	-	-	-	€268,921,786	€268,921,786
PL	€3,315,427,198	€2,866,867,400	€250,096,472	€2,837,775,337	€9,270,166,407
PT	€ 594,475,608	€452,479,456	€37,259,709	€415,908,339	€1,500,123,112
RO	-	-	€83,059,307	€884,908,677	€967,967,984
SE	€316,310,372	€272,014,792	€22,717,322	€278,165,618	€ 889,208,104
SI	€142,320,474	€120,932,209	€10,795,961	€123,185,074	€ 397,233,719
SK	€411,785,481	€349,348,043	€29,251,115	€354,369,796	€1,144,754,435
Total	€32,868,975,497	€27,841,051,802	€2,582,759,983	€29,340,354,661	€92,633,141,942

It is only possible to produce an estimate of the cost of the ETS to consumers. But, the estimates provided above should provide a pretty reliable guide to the actual costs imposed. It is highly unlikely that the ETS costs much more than €116 billion or much less than €46 billion. €93 billion is our central estimate of the cost to consumers.

This is a significant burden to impose on European consumers. It is equivalent to roughly €185 for every person in the ETS countries over the lifetime of the ETS, or an average of around €46 a year. That is despite the collapse in prices during 2007 as it became clear that allocations were higher, relative to demand, than had been expected. That collapse cut the cost to around ten per cent of the level seen in other years.

Our central estimate for the cost to British consumers in 2008 is €3.7 billion. That is nearly £3 billion or over £117 per family. Even at a 40 per cent pass-through the cost is over £58 per family.

Our estimate is higher than that produced for the impact of the ETS on average household electricity bills by Ofgem,[18] but that difference can be explained:

- Their estimate is for 2009, when emissions prices have, so far, been lower than they were in 2008.
- Their estimate does not include the cost of the ETS in sectors other than electricity.
- Their overall estimate of the impact of environmental policies on electricity prices is considerably lower than that produced by BERR in the Renewable Energy consultation.[19] BERR's estimate suggests that climate change policies – particularly the ETS and the Renewables Obligation – contribute around 14 per cent to domestic

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[18] Ofgem *'Updated Household energy bills explained'*, Factsheet 81, 6 August 2009

[19] BERR *'UK Renewable Energy Strategy – Consultation'*, Paragraph 10.5.3, June 2008

electricity bills and 21 per cent to industrial electricity bills while Ofgem put the overall cost at 8 per cent of an average household bill.

- Their estimate does not include the impact on non-household electricity consumers, as the purpose of their estimate is to help explain household electricity bills. However, increases in industrial electricity bills will affect ordinary families if they increase prices for other goods or reduce employment opportunities.

Some commentators have suggested that there could be significant rises in the carbon price, to as high as €65.[20] A carbon price at that level would mean a massive rise in the cost to consumers.

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[20] Point Carbon *'EU carbon prices 'could hit €65' if EU takes 30% target',* 3 June 2009

5. Supporting legal cases against Poland and Estonia

The British Government recently intervened in legal cases where, if they had been successful, it would have meant higher costs for consumers:

- Recently, the European Commission was involved in legal disputes with Poland and Estonia over what the cap on their emissions should be; the Commission wanted a tighter cap. A tighter cap would mean a higher carbon price and, therefore, higher costs for consumers. However, the Commission and the Government lost both cases.[21]
- Despite the Commission's strong hand in cases at the European Court of Justice, the British Government intervened and supported the Commission.
- The Treasury Solicitor's Office, responding to a TaxPayers' Alliance Freedom of Information Request, has revealed that the "costs of the United Kingdom Government's intervention in case T-183/07 Poland v Commission were £30698.10. This includes Counsel's fees of £16107.50". And, the "costs of the Government's intervention in Case T-263/07 Estonia v Commission were £12201.59. This includes Counsel's fees of £2629.50". That means that, in total, nearly £43,000 was spent on these cases.

This was clearly not in the interests of British taxpayers:

- Entering legal disputes with two new member states unnecessarily undermines attempts to establish good relations with their governments.
- A Commission victory would have led to higher energy prices for British consumers.

These legal interventions make it clear that the Government is working to increase the burden of the ETS on consumers.

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[21] Mortishead, C. 'European carbon trading market takes hit', *The Times*, 24 September 2009

Conclusions

It is increasingly clear that the ETS just isn't working. The carbon price is so volatile that energy companies and environmentalists are calling for it to be fixed while ordinary families and manufacturing firms have to cope with an unpredictable addition to their energy bills. Windfall profits for energy companies are paid for by the poor and the elderly. We estimate that the total bill to consumers across Europe has been between €46 billion and €116 billion since the start of the scheme, with British families paying more than £117 in 2008. As the permits are increasingly auctioned, that will just mean the scheme is another tax, and a regressive one, supporting excess public spending.

Rhetorically, British politicians are out to bring down high electricity prices, and when it suits them they promise to get tough on energy companies. But, when combined with other climate change policies like the Renewables Obligation, the ETS is a big part of people's bills. The Department for Business, Enterprise and Regulatory Reform has estimated that climate change policies make up 14 per cent of household electricity prices and 21 per cent of industrial electricity prices.

Policy in this area is clearly a long way from serving the interests of ordinary families, who are paying a high price for such a flawed attempt to cut emissions. Their money is even spent on legal fights in the European Court of Justice to tighten the scheme and increase their electricity bills further.

Politicians should be looking to ease the burden on ordinary families struggling to recover from the recession and should abolish the ETS.

Senator INHOFE. I am not.

Senator Voinovich.

[Laughter.]

Senator BOXER. Thank you.

Sorry. Senator Voinovich.

Senator INHOFE. It felt kind of good to take over for a minute.

Senator BOXER. Oh, did you enjoy that? Did you put the letters in the record?

Senator VOINOVICH. That is 4 minutes of my time gone.

[Laughter.]

Senator VOINOVICH. Mr. Trisko, you and Mr. Hawkins are sitting next to each other. Have you ever talked to Mr. Hawkins about the number of coal fired plants that the NRDC and the Sierra Club have fought and closed down in many States throughout the United States?

Second of all, would you agree that if they are not going to burn coal, that they are probably going to go to burning natural gas?

Mr. Cicio, you talked about loss of jobs. People just don't understand that environmental policy has a real impact on jobs. And back in 1997 and 1998 we exported $19 billion worth of chemical products. Today, we import those products. In other words, the cost of natural gas has had a tremendous impact on our economy.

At the beginning of the recession in the State of Ohio, the acid rain provisions that everybody keeps making reference to—the fact of the matter is that when they went into being, and you still probably had a debate at the time, I was there in Ohio when AEP built a scrubber, $650 million. We subsidized coal a dollar a ton so that could make that happen. And I would like all of you to comment.

By the way, I want to mention, too, I am glad that you asked this committee to have a complete analysis of this legislation, which we do not have today. And we are going to insist on that, Mr. Trisko, I can assure you. We want a complete analysis of this legislation.

But let's face it, if coal has got a problem in terms of greenhouse emissions, we need the CCS technology. We know that they say it is 10 years away. So what do we do in the meantime?

Second of all, Mr. Rowe was here this morning, who runs Exelon, and he said to me in my office, I asked him what is the future of nuclear. And today he testified that maybe we will get six or seven plants by 2020. He said that with the financial condition that we have in the country today, having the nuclear necessary to get the job done is not going to be there.

So let's say if we can't burn coal, if we can't do nuclear, where in the world does this country get the energy, the baseload energy that we need to fuel this economy that we hope will grow? Where is it coming from?

And we have people here at this table and others that have come in here and said, it is wind, and it is solar. I want to ask all of you: Where are we going to get the energy? If coal is bad, nuclear is not going to come on board the way we say it is. And by the way, we don't even give nuclear a chance in terms of renewables. We haven't included nuclear. Where are we going to get the energy to supply the baseload energy for this country during the next number of years if this cap and trade legislation goes into being?

Mr. Cicio.

Mr. CICIO. Yes, thank you, Senator. This is a very important question. I mean, if the country does plan to address climate like it is through this bill and others, the key is having an abundant supply of low cost carbon energy. OK? That is the only real solution.

We don't have that. And as I said in my comments, particularly in the short term, there is no solution other than natural gas. We have a lot of natural gas in the reserves, but what I am concerned about in my testimony is there are 400 million metric tons of carbon that the utilities are going to be short for 2012. Carbon capture is not available. Nuclear is not available. Scale from renewable is not renewable. You can't scale energy efficiency in that time period.

The only thing available is natural gas. There is 550,000 megawatts of natural gas fired power capacity out there. It is being used for peaking. All it takes is for them to say we are going to burn more gas. The capacity is there, and it could use 4.5 trillion cubic feet of gas in the period of the next couple of years.

Senator VOINOVICH. Mr. Rowe said to me that if you let the market control the situation, that we will shift to natural gas to produce the energy that we need for this country. And the point he made is that natural gas emits about half of what coal emits, and once you have built those, and they are in place, then when do you get rid of them in terms of their producing energy in this country?

Mr. Trisko, would you like to comment on that?

Mr. TRISKO. Senator, you started this line of questioning with a reference to a conversation that Mr. Hawkins and I may or may not have had about the environmental community's opposition to the construction of new well controlled coal fired power plants around the country.

Senator VOINOVICH. NO_x, SO_x, mercury, the best in the world, and they won't let them come in.

Mr. HAWKINS. Exactly, and the environmental community was highly successful in that campaign. And the irony, misfortune of the success of that campaign is that it prevented the retirement of some of the older, less efficient and dirtier plants that would go offline inevitably when new highly efficient plants are brought online.

You can deal with the carbon emission issue from the new plants through relatively simple design measures so that the plant will be subsequently capable of removing its carbon and storing it underground when we have that technology in place.

But in my judgment, our society has lost an opportunity to replace that aging fleet of power plants as a consequence of the success of that movement.

Could I comment on your gas question?

Senator BOXER. I am sorry. We have gone over a minute and a half right now.

Senator VOINOVICH. I thank the Chair.

Senator BOXER. So we are going to stop.

I just want to be clear on something, which is the modeling, since a line is being drawn in the sand by Senator Voinovich. Well, here are the facts. The facts are that our bill, 90 percent of our bill in terms of the modeling section is taken from Waxman-Markey. They had a 5-week study. We had 10 percent difference. It took another 2 weeks. This is the longest study there is.

Now, I assume when you talked about modeling, you were talking about once we get this bill to the floor and once it is changed again, because it will have to be remodeled at that stage.

We are not going to waste taxpayer money because somebody drew a line in the sand. We spent 5 weeks at EPA studying Waxman-Markey, 2 weeks studying Kerry-Boxer that is 90 percent the same as the other bill. And we are going to stand on that. The EPA stands on it. The Obama administration stands on it.

Senator VOINOVICH. Can I have equal time, Madam Chair?

Senator BOXER. No, just a minute. Yes.

Senator VOINOVICH. You are editorializing again, and I think I have an opportunity to share my opinion also.

Senator BOXER. If you wouldn't mind letting the Chairman finish her remarks.

Senator VOINOVICH. Well, the Chairman sometimes editorializes and doesn't let us even speak up.

Senator BOXER. I am happy to give you equal time.

I am not making an editorial comment. I am giving you my view and the view of the majority.

Now, you may not agree with it, but this Chairman is not going to waste taxpayer money to delay a bill that doesn't have to be delayed because of some reason that doesn't hold up since we have had 7 weeks of study.

And Senator Voinovich, you have been very clear, and I wanted to make sure because I respect you that you knew that the view of the majority is that we have a very important study from EPA that is complete. And I just wanted you to know that because I don't want you to come here next week and say, I told you I wasn't going to do anything unless you had a full study.

I want you to know that we stand by the study, and I am happy to give you equal time to respond.

Senator VOINOVICH. Thank you very much.

Senator BOXER. Of course.

Senator VOINOVICH. The fact of the matter is that I have a hold on an individual at the Environmental Protection Agency because we never have received a full analysis of Waxman-Markey. I said to the head of the EPA, Lisa Jackson, look, forget that right now. Let's go to the Boxer-Kerry bill, and let's do a full analysis. I asked her on Tuesday. She said, "We have not run a full economic modeling."

And all I would like to have before we mark up the bill would be the same kind of analysis that was done after the fact last year when we had Warner-Lieberman, and then it came out afterwards. If we are going to intelligently deal with this issue, we need to have the modeling by the Environmental Protection Agency. I need to have it. My citizens in Ohio would expect me to have it before we would go forward with it.

And, you know, the fact is it is not there, and it is absolutely certain that we need to have it if we are going to deal with this intelligently.

Senator BOXER. OK. So to be continued. I don't think I am going to convince you, and you are not going to convince me. So let's not go there today, but we will obviously be revisiting this.

Senator Whitehouse.

Senator WHITEHOUSE. Thank you, Chairman.

Secretary Adams, in your testimony you described the Clean Air Act as a complementary regulatory structure to the comprehensive program outlined in the legislation before us and described it as a hugely successful and adaptable bedrock of American environmental policy.

Could you give me your reaction to efforts to strip Clean Air Act requirements as a part of this bill? And efforts to add what are around here referred to as 3–P, the other three pollutants into a cap and trade regime and out of the Clean Air Act regulatory model as a part of this legislation?

Ms. ADAMS. I think the Clean Air Act obviously is a very important tool. There may be some tailoring of the Clean Air Act, some common sense change to perhaps raise the permitting threshold to exempt greenhouse gas emissions from national ambient air quality standards. But other technology accelerating standards we think should be retained.

We think the Clean Air Act has been very successful and needs to be retained as a tool. We believe that carbon dioxide should be expressly excluded from title I and not be defined with a national ambient air quality standard. And the threshold for requiring a permit should be raised to exclude all but major new sources.

Senator WHITEHOUSE. Thank you.

Mr. Dolezalek, in your testimony you say if we fail to act, we will lose our technological edge. We will lose the jobs associated with these companies, and ultimately we will pay others to import their clean energy technologies the way we today pay others to import their oil.

What is it about the present circumstance that requires this legislation to get us there? Why won't the market get us there on its own?

Mr. DOLEZALEK. We have been investing in these technologies since 2002. At the time, most of these were very small, young companies, and the venture community was perfectly capable of providing the funding needed.

We have now reached the stage where more and more of them are coming to commercial scale and building factories. Building factories for energy generation, for automobiles, for very large lighting is much, much more capital intensive than the venture industry has historically had to fund.

We have come to that time period at a point in time when the global funding sources that would normally have stepped in and provided a lot of that funding have shifted. So a lot of the money that would have gone into funding capital development for U.S. new energy companies has gone to Europe. It stayed in the Middle East. It is staying in China. The longer we wait from a signaling standpoint, the longer that capital stays where it has gone to.

Senator WHITEHOUSE. In addition to the capital availability question, is there also a market distortion question related to the implicit subsidy that the polluting coal and other industries have received for so many years by having all of us bear the costs of their pollution, rather than having the emitters bear the costs of the pollution?

Mr. DOLEZALEK. We have long said all we really need is a level playing field, and we will do the rest. We still are a long, long ways from a level playing field. I am not at all certain that we even get close to a level playing field even if we adopted this bill in its fullest extent, but we get a lot closer, and it makes us a lot more competitive. And a choice between not being competitive and at least being more competitive, we clearly choose to be more competitive.

Senator WHITEHOUSE. And if I could ask, my time is running out so this will probably be a question for the record for Mr. Cicio, but I would be interested to know, the record of your member companies of off-shoring jobs during the last 10 years.

To put that in context, my take on this is that for many managements, off-shoring jobs from America to other locations where lower wages, poorer working conditions and the ability to evade environmental responsibility allowed more return to management and shareholders has been a fairly prominent goal of CEOs and big corporations in this country for the last decade or so.

And given that, I take with a little bit of a grain of salt management expressed concerns about the loss of jobs, when the people whose jobs were off-shored, the folks that represent them, the labor unions, are here speaking in favor of this legislation. In that context, it would be useful to me to know what the off-shoring record is of your membership companies.

And my time has expired.

Senator BOXER. OK.

Oh, Senator Carper is here. OK, Senator, we were just about to close down and we welcome you in the nick of time.

Senator CARPER. Thanks, Madam Chair.

I apologize to our panel. I have been working on cybersecurity, and given the luncheon conversation we had with one of our former colleagues, we understand how important that is.

It is a good issue. It is a bad issue, but it is a good one to try to be on top of.

Mr. Trisko, is it Gene Trisko?

Mr. TRISKO. Yes.

Senator CARPER. Also known as Eugene Trisko.

Mr. TRISKO. As you prefer, Senator.

Senator CARPER. All right, Mr. Trisko. Thank you for being here.

Thank you all for coming today. Some of you we have had before this committee any number of times before, so welcome. And for those of you who are for the first time, we welcome you, too.

A question, if I could, for you, Mr. Trisko. Do you believe that there are uncertainties for using coal to create electricity, but uncertainties other than those relating to carbon dioxide, that may be preventing coal plants either from being built or from continuing to be utilized in this country?

Mr. TRISKO. Certainly, Senator, I suspect we are leading to a 3–P discussion here. Prominent among the uncertainties facing the power generation sector today are what EPA plans to do in terms of the replacement of the CAIR rule for the control of SO_2 and NO_x

emissions. We expect a proposal next spring, followed by a final rule the year after that.

And of equal and perhaps greater importance, what the agency intends to do concerning the regulation of mercury and other hazardous air pollutants pursuant to the Court of Appeals decision on that, and the recent consent decree that was agreed to. It is out for comment now.

Those two rulemakings together constitute a significant source of uncertainty for the industry in its planning. And there is a case to be made, just as there was as this body was considering the Clear Skies legislation several years ago, as it has considered the Clean Air Planning Act that you, Senator, have been championing for a number of years.

Senator CARPER. Which I nicknamed at the time “Really Clear Skies.”

Mr. TRISKO. Right. There is a real case to be made that a legislative solution to the criteria and now hazardous air pollutant issues facing the industry is desirable. As always, the devil is in the details, and my understanding is that some of the issues that are surrounding the current legislative proposals on 3–P are basically on the numbers side and the years side. It always comes down to that.

And from our perspective, we have looked at the legislation. We have similar concerns about the impact of your bill on the industry as we do in climate, and that is that if the caps are set too tight and they occur too soon, that that will lead a number of power generators to take offline the smaller and older inefficient generating facilities that perhaps could have been replaced by new plants if that scenario had occurred, and shut them down or put them in cycling mode and replace them with the combined cycle generation, natural gas generation.

So we have six of one and half a dozen of the other. But there is a benefit in achieving legislative certainty with regard to the timetables and levels of control to be required by the power generation sector, no question about that.

Senator CARPER. All right, thanks for that response. I would just note that there are a number of States—one of our targets for reduction is mercury. We call for reducing mercury emissions by 90 percent in our legislation, not a cap and trade approach, just a directive to reduce it for those who haven’t already addressed mercury.

And I remember sitting literally in the same room 6—5 or 6 years ago at a hearing on mercury and to what extent we were able to actually reduce mercury emissions. And for the most part, everybody said at the panel, except maybe one person who represented the industry that tried to develop ways to reduce mercury emissions. Everybody said there is no way we can get to 90 percent reduction by 2015. And as it turns out, the technology is there, and it has been implemented not throughout the country but in a lot of places. So I think we have seen just in a few years how far we have come.

Sometimes I think there is value in saying, all right, this is our target; this is where we need to be, provide a reasonable amount of time to get there, and to sort of like get out of the way of the innovations and say go to work, and they will get it done. So we will see.

I have one more quick question, if I could, for you. This is actually for David Hawkins. Let me just talk, if I could, very briefly about the LDC allowances, the local distribution companies. I believe that now we just asked the public utility commissions to designate how the LDCs can use that money to help consumers. Is that correct? Is that your understanding?

Mr. HAWKINS. There is a general directive that says that the allocation value should be used to benefit consumers, and we are recommending more specific direction.

Senator CARPER. All right. I was going to ask you, do you have any recommendations for changing the current language, and it sounds like you might?

Mr. HAWKINS. Yes, we think consumers would be much better protected if we have a presumption that a certain fraction of this allowance value be used for energy efficiency investments. The record is clear, energy efficiency works. There are many barriers in the existing regulatory system to full and fair consideration of efficiency. What we are asking is that that be where the process starts.

And if a demonstration is made that all of the cost effective opportunities for energy efficiency have been pursued, then that presumption goes away. But we think that is where it needs to start. You take a hard look at efficiency because efficiency saves money. People care about their electricity bills much more than they care about their electricity rates. And efficiency can bring those bills down.

Senator CARPER. Good. Thank you so much.

And Madam Chair, thank you for giving me that extra minute.

Senator BOXER. Thank you so much. And could you stay around, Senator, I want to talk to you after.

Senator CARPER. I would be pleased to.

Senator BOXER. Thank you.

I just want to place in the record before we thank you and let you go on your way, this is interesting. It is a press release from April 10th, 2009, about a Chinese—I can't pronounce it—HUAENG Group inks clean coal technology export agreement with a U.S. company in Pennsylvania. I don't know whether you are aware of this. A two-stage pulverized coal pressure gasification technology, and they are going to apply it to a 150-megawatt IGCC power plant, and it says in order to reduce the carbon dioxide. So it is interesting that we are now working with Chinese companies to come in and clean up our coal fired plants.

We can't continue this way. We need to take the lead in all of this. So that is the purpose of our bill. Our purpose of our bill is to keep coal in the mix big time. We are very smart. We know there is 200 years' worth of coal, and we want that to be there. We want it to be clean. And the point is, the status quo is the worst thing for coal because it is going to mean at the end of the day that EPA comes in, and there is no way to offset, and there is no way to get allowances.

So we are excited about this approach, and we know that we are gaining ground, but it is, as we heard from Stephan, since I am not going to butcher your last name again, Stephan said it well. This is all a balance. It is very difficult. Some people think we are this way, we are tilting; some people think we are that way. And we are trying to reach for this.

Well, we want to thank you all so much for being here. Every one of you was wonderful. And we may have some questions that are coming in to us for you, and we need them back within 24 hours. I know that is difficult, but we know you are such experts that you will have those answers at the top of your brains, and you will get those out.

So thank you.

We stand adjourned.

[Whereupon, at 5:10 p.m., the committee was adjourned.]

[The referenced press release was not received at time of print.]

[Additional material submitted for the record follows:]

October 28, 2009

The Honorable Barbara Boxer, Chairman
Senate Committee on Environment and Public Works
410 Dirksen Senate Office Building
Washington, DC 20510-6175

The Honorable James M. Inhofe, Ranking Member
Senate Committee on Environment and Public Works
456 Dirksen Senate Office Building
Washington, DC 20510-6175

Re: S. 1733, the "Clean Energy Jobs and American Power Act" and Transportation

Dear Chairman Boxer and Ranking Member Inhofe:

We are writing to express our shared views on S. 1733, the "Clean Energy Jobs and American Power Act" (CEJAPA). Our organizations and our members strongly believe that it is important to effectively coordinate efforts to address climate change with efforts to improve the nation's surface transportation system. Unfortunately, as written, CEJAPA will unnecessarily burden transportation agencies and interfere with the timely and efficient delivery of projects that can help reduce transportation-related emissions.

Under CEJAPA, states would establish goals for reducing greenhouse gas (GHG) emissions from the transportation sector based on models and methodologies produced by the U.S. Environmental Protection Agency (EPA), in consultation with the U.S. Department of Transportation (USDOT). In addition, states would submit plans to EPA with transportation emissions targets and criteria to reduce GHGs. While we believe that the most promising way to reduce surface transportation GHG emissions is through improvements in vehicle technology, CEJAPA's provisions focus on other approaches. Specifically, CEJAPA lays out at least 11 approaches for strategies to be considered by states and metropolitan planning organizations (MPOs), none of which focus on direct congestion reduction.

Beyond concerns over the wording of these many approaches and considerations, we are greatly concerned that confusion and needless delay will occur when the transportation planning process for which state departments of transportation and MPOs are responsible will have to be accountable to EPA as well as USDOT. We are also concerned that EPA has a primary role, rather than USDOT, in making determinations regarding modeling and methodologies to be used in the development of strategies.

Specifically, CEJAPA allows the approval of state and MPO GHG reduction plans only in cases where USDOT in consultation with EPA determines the plan is "likely to achieve" targets established by the state or MPO. This language is more onerous than what has been offered in

H.R. 2454, the "American Clean Energy Security Act" (ACES). Whereas ACES similarly required the submission of a GHG reduction plan by states and MPOs to USDOT, it did not provide for USDOT and EPA approval of the plan based on what they anticipated the results to be. Rather, ACES leaves that responsibility with states and MPOs. While we also have concerns with ACES, inserting additional federal agencies into the transportation planning process will only lead to needless delay of transportation improvements.

To the extent that Congress chooses to add climate change features to the transportation planning process, it should do so through changes to existing transportation planning statutes administered by USDOT. EPA certainly does have a role, but within the framework of a single USDOT administered process. In sum, changes to the transportation planning process should be carefully crafted and structured as part of existing laws, not as part of a new regime administered in part by a separate agency.

We request that the CEJAPA be amended to ensure that USDOT retains full federal authority over transportation planning and that states and MPOs be allowed the flexibility to develop plans that work for their particular area without the requirement of federal approval beforehand. Without your leadership in advancing a course correction, we are concerned that CEJAPA, as currently written, would reverse recent bipartisan efforts to streamline the planning and project delivery processes.

We further note that CEJAPA includes a "Transportation Greenhouse Gas Emissions Reduction Program" designed to produce funds for activities that address climate change. While we certainly support increased transportation funding, it is important these funds be allowed to be used for any surface transportation investments that are consistent with efforts to address climate change. Options should be mode-neutral and include a variety of transportation improvements, including public transportation investments that reduce carbon dioxide emissions as well as activities such as traffic light synchronization, turning lanes and other means of reducing congestion and easing air pollution from highways, including at highway bottlenecks.

We respectfully submit these comments for your consideration and look forward to working with the Environment and Public Works Committee to strike an improved balance between the important goals of addressing climate change, achieving an improved surface transportation system, and developing a streamlined yet thorough transportation planning and project delivery process.

Sincerely,

AAA
American Council of Engineering Companies
American Highway Users Alliance
American Road and Transportation Builders Association
Associated General Contractors of America
National Stone, Sand, and Gravel Association

NARUC
National Association of Regulatory Utility Commissioners

October 28, 2009

The Honorable Barbara Boxer
Chairwoman
Environment & Public Works Committee
United States Senate
410 Dirksen Senate Office Building
Washington, D.C. 20510-6175

The Honorable James M. Inhofe
Ranking Member
Environment & Public Works Committee
United States Senate
456 Dirksen Senate Office Building
Washington, D.C. 20510-6175

Dear Chairman Boxer, Ranking Member Inhofe:

On behalf of the National Association of Regulatory Utility Commissioners (NARUC), I am writing to express our preliminary views on the Clean Energy Jobs and American Power Act (S. 1733). As regulators of our nation's utility companies, NARUC members have a critical stake in ensuring that consumers are not unduly burdened in the transition to a low-carbon economy. We appreciate the Committee's decision to provide a significant allocation of free emission allowances to regulated Local Distribution Companies (LDCs), in recognition of the key role that utility regulators play in protecting consumers. This will ensure that State regulators are able to pass through to consumers the value of these allowances.

However, while the LDC allocation is an important consumer protection, we are concerned that the bill is overly restrictive and will discourage States' creativity in sharing allowance benefits with consumers. In addition, we strongly oppose the allocation of free allowances to merchant generators, who have no obligation to share any proceeds with ratepayers. We stand ready to work with this Committee and Congress as this bill moves forward.

Since 2007, NARUC has advocated a well-designed, economy wide market-based approach for reducing carbon emissions. We believe such action will bring about much-needed certainty in the energy industry so that companies can finance the next round of utility infrastructure investment. To that end, if Congress pursues a cap-and-trade system for reducing carbon emissions, it should provide all free transitional allowances within the electricity sector to rate-regulated LDCs.

We are pleased that the Clean Energy Jobs and American Power Act contains House-passed language establishing a corporation to research and develop carbon-capture and sequestration technologies. We are also encouraged by the recent editorial penned by bill sponsor Sen. Kerry and Sen. Graham that stressed the need for nuclear power and a cost-containment mechanism, both of which will reduce the costs of compliance if the legislation is passed.

Although the Clean Energy Jobs and American Power Act, intends to allocate a significant amount of free allowances to LDCs, it provides an allocation to merchant generators as well. NARUC opposes providing any no-cost allowances to unregulated merchant generators, which have no obligation to pass through benefits to consumers. Operating in a competitive market, merchant generators will likely retain the value of free allowances as profits, just as we saw in the European Union.

While the LDC allocation will serve to protect consumers, published studies have demonstrated that any merchant allocation could result in windfall profits and "unproductive costs" that will do nothing to incentivize clean energy technologies. Indeed, the draft legislation anticipates that merchant generators may receive windfall profits in Section 771, (c)(5)(B) by requiring the Environmental Protection Agency and Federal Energy Regulatory Commission to implement new rules if both agencies make "an affirmative finding of windfall profits or disparate treatment" resulting from this allocation. If Congress is concerned about windfall profits, it can solve this problem quite easily by not granting free emission allowances to merchant generators in the first place.

In addition, we have great concerns about the workability of the legislation. This draft and the House-passed bill include language significantly limiting how State commissions can distribute LDC allowance proceeds. Both bills require the benefits to be shared "ratably" and "equitably" within and among utility consumer classes. They also appear to require that industrial and residential consumers receive a direct cash rebate from allowance proceeds if it is proven that the cap-and-trade system caused their energy bills to increase.

These provisions are problematic because they foster uncertainty and potential litigation. Just who will determine what "ratably" and "equitably" mean, and how will that impact the decision to issue flat rebates when the industrial and residential consumers demonstrate that their power bills have increase? In addition, if Congress wants to encourage and help fund energy efficiency and clean energy projects, this language unnecessarily prohibits what could otherwise be a strong revenue stream that could be dedicated for these investments. State commissions have historically encouraged significant amounts of clean energy investment, and, as we have seen with the Regional Greenhouse Gas Initiative States, proceeds from the nation's only functioning cap-and-trade market are being used for energy efficiency investment.

The current legislative language does not appear to comprehend that using the LDC allocation investments for energy efficiency and clean energy programs represent consumer benefits as well. If Congress strictly determines that proceeds can be used only for amorphous consumer rebates, it will make complying with the new carbon rules more difficult over the long term by limiting the amount of money that can be used to invest in clean energy and energy efficiency programs. We urge the Senate to think carefully before handcuffing State regulators' ability to ensure that allocation proceeds truly benefit consumers, because the present legislative language is a recipe for litigation.

NARUC understands the need for federal oversight of what will undoubtedly be a significant amount of money flowing between LDCs and consumers. However we also believe that State commissions are far more accountable to ratepayers than distant bureaucracies in Washington, and are far more efficient at developing innovative and entrepreneurial clean energy programs. State commissions know their localities and constituents best, and we are obligated to ensure fair, just, and reasonable rates. The Senate should give States more leeway in distributing allowance proceeds so consumers can truly benefit.

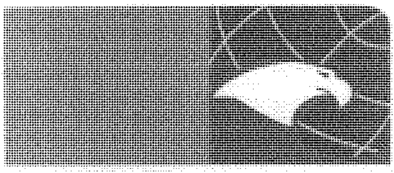
While we are still reviewing the rest of the legislation, we would like to work with members of this Committee to address these workability concerns and make the Clean Energy Jobs and American Power Act a stronger product. We share your desire to protect consumers from higher electricity rates, particularly in a time when utility bills are increasing and customers are already pinched. In our view, a cooperative federal-State relationship that provides the flexibility necessary to tailor solutions to local energy markets is the most appropriate way to ensure that consumers are not overly burdened in the transition to a low-carbon future.

NARUC stands ready to assist you and your colleagues as the legislative process continues.

Sincerely,

Frederick F. Butler
President, NARUC

CC: Members of the Senate Committee on Environment & Public Works



SecurityAndClimate.cna.org

NATIONAL SECURITY AND THE THREAT OF CLIMATE CHANGE

The CNA Corporation
Research that works, for work that matters

EXECUTIVE SUMMARY

The purpose of this study is to examine the national security consequences of climate change. A dozen of the nation's most respected retired admirals and generals have served as a Military Advisory Board to study how climate change could affect our nation's security over the next 30 to 40 years—the time frame for developing new military capabilities.

The specific questions addressed in this report are:

1. What conditions are climate changes likely to produce around the world that would represent security risks to the United States?
2. What are the ways in which these conditions may affect America's national security interests?
3. What actions should the nation take to address the national security consequences of climate change?

The Military Advisory Board hopes these findings will contribute to the call President Bush made in his 2007 State of the Union address to "...help us to confront the serious challenge of global climate change" by contributing a new voice and perspective to the issue.

FINDINGS

Projected climate change poses a serious threat to America's national security.

The predicted effects of climate change over the coming decades include extreme weather events, drought, flooding, sea level rise, retreating glaciers, habitat shifts, and the increased spread of life-threatening diseases. These conditions have the potential to disrupt our way of life and to force changes in the way we keep ourselves safe and secure.

In the national and international security environment, climate change threatens to add new hostile and stressing factors. On the simplest level, it has the potential to create sustained natural and humanitarian disasters on a scale far beyond those we see today. The consequences will likely foster political instability where societal demands exceed the capacity of governments to cope.

Climate change acts as a threat multiplier for instability in some of the most volatile regions of the world. Projected climate change will seriously exacerbate already marginal living standards in many Asian, African, and Middle Eastern nations, causing widespread political instability and the likelihood of failed states.

Unlike most conventional security threats that involve a single entity acting in specific ways and points in time, climate change has the potential to result in multiple chronic conditions, occurring globally within the same time frame. Economic and environmental conditions in already fragile areas will further erode as food production declines, diseases increase, clean water becomes increasingly scarce, and large populations move in search of resources. Weakened and failing governments, with an already thin margin for survival, foster the conditions for internal conflicts, extremism, and movement toward increased authoritarianism and radical ideologies.

The U.S. may be drawn more frequently into these situations, either alone or with allies, to help provide stability before conditions worsen and are exploited by extremists. The U.S. may also be called upon to undertake stability and reconstruction efforts once a conflict has begun, to avert further disaster and reconstitute a stable environment.

Projected climate change will add to tensions even in stable regions of the world. The U.S. and Europe may experience mounting pressure to accept large numbers of immigrant and refugee populations as drought increases and food production declines in Latin America and Africa. Extreme weather events and natural disasters, as the U.S. experienced with Hurricane Katrina, may lead to increased missions for a number of U.S. agencies, including state and local governments, the Department of Homeland Security, and our already stretched military, including our Guard and Reserve forces.

Climate change, national security, and energy dependence are a related set of global challenges. As President Bush noted in his 2007 State of the Union speech, dependence on foreign oil leaves us more vulnerable to hostile regimes and terrorists, and clean domestic energy alternatives help us confront the serious challenge of global climate change. Because the issues are linked, solutions to one affect the other. Technologies that improve energy efficiency also reduce carbon intensity and carbon emissions.

RECOMMENDATIONS OF THE MILITARY ADVISORY BOARD:

1. The national security consequences of climate change should be fully integrated into national security and national defense strategies.

As military leaders, we know we cannot wait for certainty. Failing to act because a warning isn't precise enough is unacceptable. The intelligence community should incorporate climate consequences into its National Intelligence Estimate. The National Security Strategy should directly address the threat of climate change to our national security interests. The National Security Strategy and National Defense Strategy should include appropriate guidance to military planners to assess risks to current and future missions caused by projected climate change. The next Quadrennial Defense Review should examine the capabilities of the U.S. military to respond to the consequences of climate change, in particular, preparedness for natural disasters from extreme weather events, pandemic disease events, and other related missions.

2. The U.S. should commit to a stronger national and international role to help stabilize climate change at levels that will avoid significant disruption to global security and stability.

Managing the security impacts of climate change requires two approaches: mitigating the effects we can control and adapting to those we cannot. The U.S. should become a more constructive partner with the international community to help build and execute a plan to prevent destabilizing effects from climate change, including setting targets for long term reductions in greenhouse gas emissions.

3. The U.S. should commit to global partnerships that help less developed nations build the capacity and resiliency to better manage climate impacts.

As President Bush noted in his State of the Union speech, "Our work in the world is also based on a timeless truth: To whom much is given, much is required." Climate forecasts indicate countries least able to adapt to the consequences of climate change are those that will be the most affected. The U.S. government should use its many instruments of national influence, including its regional commanders, to assist nations at risk build the capacity and resiliency to better cope with the effects of climate change. Doing so now can help avert humanitarian disasters later.

Statement of Dan Keppen
Executive Director
The Family Farm Alliance

For the Legislative Hearing on
The Clean Energy Jobs and American
***Power Act*, S. 1733**

Before the Committee on Environment and Public Works
United States Senate

October 28, 2009

Madam Chairwoman and Members of the Committee:

Thank you for the opportunity to submit this statement on *The Clean Energy Jobs and American Power Act* (S. 1733) on behalf of the Family Farm Alliance (Alliance). My name is Dan Keppen and I am the Executive Director of the Alliance, a grassroots organization of family farmers, ranchers, irrigation districts and allied industries in 16 Western states.

The Family Farm Alliance is focused on one mission: To ensure the availability of reliable, affordable irrigation water supplies to Western farmers and ranchers. We are also committed to the fundamental proposition that Western irrigated agriculture must be preserved and protected for a host of economic, sociological, environmental and national security reasons – many of which are often overlooked in the context of other policy decisions.

The Alliance's comments on S. 1733 are limited to the natural resources and water system adaptation programs in Title III, Subtitle C, Part 1, Subparts C and D, of the amendments proposed by Chairwoman Boxer and Senator Kerry at the end of September. We have not had the opportunity to fully analyze the "chairman's mark" released a few days ago, but it appears that the adaptation provisions of the mark and the September draft are substantially the same.

Adaptation Provisions are Needed for Domestic Agriculture

There is broad scientific consensus that even modest changes in the global climate will likely alter precipitation patterns in ways that could pose serious threats to water supplies and agricultural production worldwide, particularly in arid regions such as the American West where a large portion of agricultural production is dependent upon irrigation. A significant reduction in the amount of food and fiber produced by American farmers would have adverse consequences for our economy and national security and for our trading partners abroad.

Safeguarding our ability to feed ourselves should be one of the principal goals of any legislation whose purpose is to marshal a national effort to minimize and adapt to the effects of climate change.

Unfortunately, preservation of domestic agricultural production is not a defined goal of the proposed amendments to S. 1733.

Like the House-passed climate legislation (H.R. 5424), the Boxer-Kerry proposal would commit the federal government to employ "*all practical means*" to protect fish and wildlife from the adverse effects of climate change, but it includes no comparable commitment to ensuring the continued vitality of domestic agriculture and agriculturally-based rural communities.

As part of the *Domestic Adaptation* program in Title III, the Boxer-Kerry amendments authorize and fund a large, multi-layered, federal-state effort "*to protect, restore, and conserve natural resources so that natural resources become more resilient, adapt to, and withstand the ongoing and expected impacts of climate change.*" This includes establishment of a "*Natural Resources Climate Change Strategy,*" mandates for federal and state *natural resources adaptation plans* and creation of a *Natural Resources Climate Change Adaptation Account* funded by emissions trading revenues.

The Family Farm Alliance supports the goal of conserving natural resources and with fish and wildlife adaptation planning, research and programs. But the lack of comparable attention to adaptation needs of domestic agriculture and rural communities calls into question the intent and effects of a large-scale effort focused exclusively on natural resources.

Increased Conflict and Complexity for Local Resources Managers

The establishment of a far-reaching national mandate to use "*all practical means*" to protect fish and wildlife, without a comparable commitment to agriculture or other economic activities, will likely exacerbate rather than avoid conflicts over natural resources. All other interests will become secondary to the new natural resources goal, and this bias will impede efforts to achieve an appropriate balance between agricultural production and conservation.

We are very concerned that federal agencies or outside interests could use the "*all practical means*" mandate to undo existing federal resources management laws, agreements, permits and water supply contracts without regard to the consequences for ranchers, farmers and rural communities. The language requiring that the mandate be carried out "*in cooperation with*" state and local governments, Indian tribes and stakeholders is cold comfort when so much of existing environmental policy already is driven by litigious interest groups.

We also are concerned that the natural resources adaptation program envisioned by the proposed amendments could significantly enlarge the federal presence in local decision-making. We see the potential for greater regulatory burdens and even slower, more cumbersome federal review of state and local projects.

A Welcome Proposal: Water System Mitigation and Adaptation Partnerships

The Boxer-Kerry amendments do recognize that climate change could have major impacts on water supplies. The proposal would establish new *Water System Mitigation and Adaptation Partnerships* program (in Title III, Subpart D) to provide additional resources to help the managers of water systems, including irrigation systems, to undertake projects and programs to cope with the negative effects of climate change. The Alliance welcomes this important addition to the legislation, which is a significant improvement over the House-passed bill, and our members greatly appreciate the Chairwoman's efforts to seek advice from water users and other stakeholders during its drafting.

Although the water system mitigation and adaptation partnership program is a positive proposal, the overall bill still misses the opportunity to more broadly address the growing crisis in Western water supply by failing to make the conservation of agriculture a priority on a par with conserving fish and wildlife. Even without the added pressure of climate change, population growth and increasing environmental demands are putting an unprecedented strain on water supplies in the West. Many outside of the agricultural community believe that these strains, and any adverse effects of climate change, can be addressed simply by taking water away from agriculture. That is not a solution and it's not planning. It's a default position that will undermine the strength and depth of our ability to feed ourselves and to help feed a hungry world.

Reinforcing the *Secure Water Act*

Earlier this year, Congress moved to address the potential impacts of climate change on western state water supplies. It approved the *Secure Water Act* (P.L. 111-11, Title IX, Subtitle F) creating federal inter-agency programs to assess the effects of climate change on water supplies, develop strategies and technologies to address potential water shortages and increase the collection of data on current and future water supply availability.

The Boxer-Kerry draft includes a program (in Title II, Subtitle B) for research and development of adaptation strategies for drinking water utilities that is similar to the authorities in the irrigation-focused *Secure Water Act*, and the Alliance believes that the goals and programs of the *Secure Water Act* should be specifically incorporated into any comprehensive climate legislation to ensure that they receive adequate resources and equal emphasis.

Other Specific Observations

We also ask that you consider these other observations regarding the bill's proposed comprehensive drinking water research program; the role of agricultural organizations; the proposed *National Climate Change and Wildlife Science Center*; the potential for federal agencies to acquire more private land; the proposed *Habitat and Corridors System;* and a bias throughout the draft toward "non-structural" rather than proven infrastructural fixes to water supply and flood control challenges. These concerns are detailed further below.

Improve the Comprehensive Drinking Water Research Program

Section 211 finds that there is a need for a comprehensive program of research into the full range of impacts on drinking water utilities, including impacts on water supplies, facilities, and customers. This is laudable - similar findings and provisions to address agricultural water supplies are also warranted. An existing nonprofit water research foundation – with the assistance of water utilities - has been targeted as the entity to perform the research outlined in this section. To ensure a proper balance, agricultural water interests must also be represented in this process. The research criteria proposed to guide this effort raises some concerns because they appear to be biased towards demand-management and other "non-structural" solutions. Agricultural water users are concerned that over-reliance on "non-structural" methods to meet growing urban water demands will inevitably result in a large-scale reallocation of water away from agriculture. Structural solutions that enhance or protect existing water supplies while adapting to a changing climate must be included in a broad suite of water management actions that include demand management.

Include Local and Agricultural Representation in Climate Change Adaptation Strategy

The proposed *Natural Resources Climate Change Adaptation Strategy* could be improved by putting more focus on local involvement, and at least mention the need for agricultural interests to be engaged. This change is necessary to balance the draft's explicit emphasis on involvement by "*conservation organizations.*"

Reconsider Creating the *New National Climate Change and Wildlife Science Center*

Farmers and ranchers and others in the regulated community will have concerns regarding the creation of the new *National Climate Change and Wildlife Science Center* that would be housed in the U.S. Geological Survey. On the surface, this would appear to be a constructive approach: embed within an agency known for its sound scientific methods a new charge that would bring wildlife experts into the fold, to recommend measures to protect fish, wildlife and plants from climate change impacts. The concern many of our members may have is that, with time, they will have another set of potentially conflicting federal priorities and accompanying regulatory demands to contend with. This is a very real concern, as evidenced by the economic hardships – driven in part by conflicting federal agency directives – that growers in the Klamath Basin in Oregon and California and the Central Valley of California have endured.

De-Emphasize Proposals for Federal Agencies to Acquire Private Land

We have serious concerns about the adaptation strategies that federal agencies will be required to develop. These strategies are intended to *"protect, restore, and conserve natural resources to become more resilient, adapt to, and better withstand"* climate change impacts. Acquisition of land and water is seen by federal agencies as necessary ingredients of any successful effort for the *"restoration and conservation of ecological processes."* The proposed amendments would place funds in several federal agency budgets to acquire even more land and *"interests in land."* Agricultural land and water holdings would be likely candidates for acquisition as a *"practical measure"* to conserve natural resources. We are already hearing from our members that federal agencies are gearing up for a big "land grab" using climate change as justification. This fear can be alleviated with assurances that these strategies will be implemented in a cooperative manner with private landowners and local communities, with an emphasis on keeping the lands in private ownership and providing incentives as a means of reaching strategic goals.

Ensure that Habitat and Corridors Program is Not Used to Obstruct New Infrastructure

The Department of the Interior is directed to cooperate with states and Indian tribes to establish the Habitat and Corridors System. The idea of coordinating data collection that can help with wildlife management decision-making is laudable. However, the uses of this data may be of concern to our members, based on the purposes of this program, which, in part, includes avoiding, minimizing and mitigating the impacts on fish and wildlife habitat and corridors when locating energy development, water, transmission, transportation, and other land use projects. The tone of this section implies that these latter uses are somehow secondary to fish and wildlife interests, which will make it difficult to develop infrastructure necessary to deliver water and power to Western communities that are dependent on those resources, and will become even more difficult in an uncertain economic climate.

Structural and Non-Structural Flood Control Measures Should be Promoted

Sec. 382 – *"Flood control, protection, prevention, and response"* - establishes a program for distribution of funds by states for flood control, protection, prevention and response projects. This could create another program that can be thrown in the mix with existing (and sometimes conflicting) flood management authorities provided to the Corps of Engineers, FEMA and USDA-NRCS. One of the objectives of this program is to *"identify, maintain and restore ecosystems and natural barriers integral to flood control, protection, prevention and response."* While these types of non-structural approaches to flood control are applicable in some specific instances, this focus should not preclude also exploring more traditional and well-tested structural measures of flood control and bank protection that may be more appropriate for the situation.

Conclusion

Farms and communities in the western United States may face the prospect of economic disruption and increased competition and conflict over land and water resources as a result of climate change. Helping them adapt to and withstand the impacts of climate change should be no less a national priority than meeting the needs of fish and wildlife.

The Family Farm Alliance has developed a set of principles for climate change legislation, a copy of which is attached. These principles could be incorporated into a separate agricultural adaptation title, or into an expanded natural resources adaption program.

Thank you again for considering over views. We look forward to continuing to work with the Committee on this important matter.

Family Farm Alliance
Principles for Climate Change Legislation

- **It is the policy of the Federal Government that the United States remain self-sufficient in food production**

  Legislative options
  - Finding: "The consequences of global climate change, including disruption of agricultural production, decreased availability of fresh water supplies and destabilization of rural economies, are likely to pose long-term challenges to the national security and economic interests of the United States."

  - Policy statement: "It is the policy of the Federal Government that the United States remain self-sufficient in food production and, in cooperation with State and local governments, Indian tribes, and other interested stakeholders to use all practicable means and measures to enable domestic agricultural production to become more resilient, adapt to, and withstand the impacts of climate change."

- **The means and resources necessary for agricultural self-sufficiency, including water supplies and related infrastructure for irrigated agriculture, must be protected and enhanced to enable them to adapt to and withstand the impacts of climate change.**

  Legislative options
  - Include this principle among the goals of a national climate change adaptation strategy and implementation plans.

  - Require that any inter-agency adaptation panel coordinate with the *Climate Change and Water Intergovernmental Panel* created by Section 9506 of the *Secure Water Act.*

  - Allocate emission allowances specifically to fund programs and activities authorized by the *Secure Water Act*, including cooperative agreements and grants to non-federal entities authorized by Section 9503 (adaption feasibility studies); Section 9504 (water management improvements); Section 9506 (demonstration projects) and Section 9508 (state water agency data collection).

  - Provide authority and funding for the Secretary of Interior to expedite improvements or repairs to Bureau of Reclamation water and power infrastructure where necessary to improve adaptation to climate change

  - Require the Bureau of Reclamation and the Department of Agriculture to develop criteria for existing grant programs to include cost-shared climate change-related adaptation projects that include watershed hydrologic studies, water management improvements, water conservation projects, and water supply infrastructure planning, design, and construction. (Programs include Reclamation's Challenge Grant Program and the USDA's Rural Water, Watershed and Flood Prevention Operations Program, Agricultural Water Enhancement Program (AWEP) and Environmental Quality Incentives Program (EQIP).)

- **Scientifically sound and complementary adaptation strategies and plans must be developed to manage water supplies for agricultural production and natural resources**

  Legislative options
  - Include this principle among the goals of a national climate change adaptation strategy and implementation plans.
  - Require federal agencies to give priority in existing grant program to projects and programs that enhance the adaptability and resiliency of both agricultural and natural resources.

- **When water laws and environmental laws conflict, balanced solutions that respect both socioeconomic realities and the environment must be found.**

  Legislative options
  - Include this principle among the goals of a national climate change adaptation strategy and implementation plans.

- **Existing agricultural water supplies cannot be relied upon to mitigate the adverse impacts of climate change on natural resources or urban water supplies**

  Legislative options
  - Include this principle in the goals of a national climate change adaptation strategy and implementation plans.

- **Adaptation strategies and plans for natural resources and agricultural production must seek to conserve and enhance existing water supplies and accommodate the development of new supplies where necessary to address shortages resulting from climate change and population growth**

  Legislative options
  - Include this principle among the goals of a national climate change adaptation strategy and implementing plans.
  - Direct CEQ to convene a broad-based stakeholder group to help develop a Federal climate change adaptation strategy for water resources that optimizes the authorities provide by the *Secure Water Act*, including development and funding of climate-related, hydrologic watershed-specific models that inform and support adaptive water management practices and infrastructure projects.

- Include authorizations for studies and pilot programs to improve watershed health and to develop strategies for mitigating and adapting to climate change impacts, including reduced water yields at existing reservoirs and forest management practices to deal with pine-beetle impacts.

- Direct CEQ, to convene a broad-based stakeholder group to help develop and implement a plan to streamline the regulatory process to eliminate duplication and reduce decision-making times for projects to conserve, enhance and expand water supplies and water supply infrastructure where necessary to address shortages or expected shortages resulting from climate change. CEQ would submit the plan to Congress by a date certain along with recommendations, if any, for legislative changes necessary to implement the plan.

- **Adaptation strategies and plans for watersheds in support of both natural resources and agricultural production must be developed in cooperation with state and local authorities and with deference given to state and local laws relating to water resource allocation, use, control and transfer.**

  Legislative options

  - Include this principle in the goals of a national climate change adaptation strategy and implementation plans.

  - Provide for local-level (irrigation agencies, local conservation organizations, local governments, etc) participation in inter-agency panels and programs for the development of adaptation strategies and plans

  - Provide incentives for locally-based and directed watershed planning efforts that can inform the development and implementation of federal agency adaptation strategies for natural resources and agricultural production.

  - Require federal agencies to incorporate activities of existing resources management programs (USDA's Environmental Quality Incentives Program and Agricultural Watershed Enhancement Program, etc) into interagency adaptation planning and implementation.

  - Include this provision at an appropriate place in the legislation: "Nothing in this Act shall affect or be inconsistent with state water law, water rights, and/or regulations."

- **State and local adaptation strategies and plans must consider the impact of continued growth and they must identify alternatives to reliance on agricultural water supplies to support development.**

  Legislative options

  - Include this principle in the goals of a state adaptation strategies and implementation plans.

  - Make consideration of future growth planning and management a requirement for state adaptation plans

- **Rural, resource-dependent communities must be given assistance to reduce their vulnerability and provide increased resilience to climate change**

  - Include provisions authorizing assistance, funded by emission allowances, for rural agricultural and resource-based communities

  - Provide incentives for the preservation of farmland and associated water supplies

As climate legislation progresses in the Congress, it is important to recognize the above principles as good public policy that could be implemented today with or without legislation regulating carbon. These principles recognize the need to protect our water and land for many purposes, including the production of food and fiber, from the impacts of our changing climate.

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